The ABCs of Regulation:

The Effects of Occupational Licensing and Migration Among Teachers

Chelsea Arbury, Gerardo Bonilla, Thomas Durfee, Megan Johnson & Robin Lehninger

January 17, 2015

Acknowledgements

We would like to thank Dr. Morris Kleiner at the Humphrey School of Public Affairs for his encouragement and continued support throughout this project, as well as for his opinions on several earlier drafts of this paper. We would also like to thank Dr. Richard Todd and Dr. Sam Schulhofer-Wohl from the Federal Reserve Bank of Minneapolis for their expert advice and guidance. We genuinely appreciate the opportunity to analyze the effects of occupational licensing and migration across the teaching profession. We sincerely thank all of our interviewees without whom this project would not have been possible. Our hope is that this paper will provide useful information to Dr. Kleiner at the Humphrey School of Public Affairs, the Federal Reserve Bank of Minneapolis, and policymakers and educators across the nation.

Abstract

This project examines the intersection of occupational licensing and migration in the teaching profession in the United States, with a focus on preschool teachers, K-12 teachers, and teaching assistants. We attempt to determine the impact of occupational licensing requirements for teachers as a barrier or facilitator of migration and professional development. The methods employed included a literature review, a qualitative analysis based on interviews with teachers and others in the education profession, an online discourse analysis, and quantitative analyses of the teacher and teaching assistant workforces. Teachers are among the most widely licensed professionals and are more likely to face training and licensing requirements than their teaching assistant counterparts. However, different licensure requirements across states limit the ability for teachers to efficiently transition across the teaching profession and across the nation. For teachers, the obscurity of individual state licensure requirements represents one of the largest obstacles to entry into the state's licensed workforce. Our research also indicates that licensure requirements do not accurately represent skills teachers will utilize in the classroom. However, the potential for these laws to better facilitate teacher preparedness exists. The ability for teachers to fill looming deficits in subject matter and geographical locales will be limited without appropriate changes to communication of licensing standards and a more fluid reciprocal licensure system.

Keywords: occupational licensing, migration, teachers, education

Table of Contents

Executive Summary

This research paper examines whether occupational licensing affects the mobility of K-12 teachers, teaching assistants, and preschool teachers in the United States. From a qualitative perspective, we explore the history of occupational licensing as it pertains to education and economic theory on the effects of licensing through an extensive literature review. These results are supported through participant interviews ranging from practicing teachers to education administrators. Our analysis shows a wide consensus among participants that occupational licensing restricts the opportunity for individuals to enter the field of education, both initially and upon moving across state lines, although the magnitude of this impact is considerably less than expected. Among the teachers we spoke to, those who had moved across states lines did so for personal, rather than professional, reasons and many did not seek licensure in the new states. We support these qualitative findings with quantitative research on teacher migration.

From an empirical perspective we explore how state licensure differences for teaching assistants and teachers impact interstate and intrastate mobility in the United States. We observe changes in licensure regimes and migration behavior from 2001 through 2012. We use the Integrated Public Use Microdata Series (IPUMS) database to form our analysis. The IPUMS database draws from the American Community Survey (an ancillary survey to the U.S. Census). This data represents 1% of the general population and is designed to represent a random sampling of the population.[1] We combined this information with current research done by Dr. Morris Kleiner on reciprocity and endorsement that details the changes in licensure reciprocity and license endorsement for each state since 2000.

[1] For a detailed explanation of the variables used, see the quantitative appendix.

The study employs three methods to evaluate the impacts of the change of licensure policy: inverse propensity weighted (IPW) matching model with probit, simple regression model with fixed effects, and a multi-period difference in difference model. Using an inverse propensity weighted matching model with the probit, we find that the profession differs from the general public with respect to migratory behavior. This IPW matches similar individuals on observable differences but assumes that nothing is done to control for unobservable variables such as motivation nor does it infer causality in this case. Preliminarily we find that teachers are 0.44 percent less likely than the general population to move out of the state.[2] Similarly, we find that teaching assistants are 0.53 percent less likely to move out of the state. Following this IPW matching, we utilize a simple regression model and a difference in difference model both with year and state fixed effects to analyze the impact of licensure on migration with respect to teaching professions. Preliminary results show that for both teachers and teaching assistants endorsement and reciprocity in a given state have a small impact on whether an individual moves out of the state, although this impact is statistically significant. Further, preliminary results show that for both professions the impact of endorsement and reciprocity in a given state has a small, statistically significant influence on whether a teacher moves into a state.[3] The next steps in our analysis include additional sensitivity analysis to ensure our findings are sound and additional analysis of the impact of reciprocity and endorsement on internal migration of teachers and teaching assistants.

[2] This finding was statistically significant at the 0.01 level.
[3] This finding was statistically significant at the 0.01 level.

1. Introduction

State occupational regulation and its effect on the labor market and workers' mobility have gained widespread national attention in recent years. In a 2011 executive report, the Obama Administration highlighted the obstacles that occupational licensure regimes place on military spouses' careers when they move state-to-state. In particular, the report listed as a priority developing "career and educational opportunities for military spouses […] by reducing barriers to employment and services due to different state policies and standards" (Strengthening Military Families, 2011). This issue continues to be a topic of discussion for the Joining Forces task force, an initiative led by Michelle Obama and Jill Biden to improve wellness, education, and employment opportunities for veterans and their families.

Although military families are particularly vulnerable to these licensing regimes, since the nature of their service often requires them to move around the country, all licensed professionals wishing to move between states while continuing their careers face similar obstacles. The teaching profession provides an excellent example. Since the 1950s, teacher licensure has transformed from a system of few requirements and almost no competency testing into a universally licensed occupation with general education, competency testing, and practical experience requirements (Kleiner, 2010). Because each state sets its own licensure requirements, the increased and varied level of licensure imposes barriers to entry on teachers from other states.

There are also geographically concentrated teacher shortages in some urban and rural areas. While shortage areas exist across the United States, migration of teachers is facing a downward trend. In fact, migration of the United States population as a whole has fallen by fifty percent over the past twenty years (Kaplan & Schulhofer-Wohl, 2013). If a state has a teacher shortage in a particular area, whether content-based or geographically, it would need to do more to attract teachers to move in than it did twenty years ago.

The purpose of this paper is to examine whether teacher licensure regulations affect the interstate mobility of public school teachers. It seeks to answer the following questions:

1. What impact does occupational licensing have on the interstate migration of educational professionals and their employment opportunities?
2. How does that licensing affect the quality of preschool, primary, and secondary educators?

To answer these questions, we employ a mixed-methods approach consisting of both qualitative and quantitative analyses. Our qualitative research was conducted through interviews of twelve respondents who are teachers or have worked in education administration or other related roles. The interviews were supplemented with an extensive literature review to contextualize the research question, as well as online discourse analysis to broaden the pool of respondents. The quantitative analysis used American Community Survey (ACS) data and largely focused on the question of whether teacher licensure impacts teacher migration.

This paper is organized as follows: we begin with a brief background on occupational licensing and interstate migration trends in the United States. This includes a description of current teacher licensure regulations. Second, we provide an overview of the key points raised by our qualitative analysis of kindergarten through twelfth grade (K-12) teachers, preschool teachers, and teaching assistants. Third, we discuss our quantitative results on the impact of licensure on migration. Finally, we offer some brief conclusions and policy implications.

2. Background

Occupational Licensing

Occupational regulation is the process by which a government sets standards for entering and practicing a profession. In the United States today, over 800 occupations are licensed by at least one state (Kleiner and Krueger, 2013). Of these, at least 60 are licensed in nearly every state (Cox & Foster, 1990). Furthermore, an estimated 20 to 30 percent of U.S. jobs require licensure or certification, two prevalent forms of occupational regulation (Rabben, 2013). Despite widespread and growing licensure across the nation, there is no federal structure governing professional certification of these occupations. Much of the occupational regulations are designed by and left to state governments (Rabben, 2013).

The most common forms of occupational regulation in the United States are licensure, certification, and registration. Licensure requires individuals to meet a set of basic requirements in order to legally practice a profession; they must prove competency before an established authority in order to achieve a license. Certification, while not restricting entry to the profession, allows those who meet a set of established basic requirements to apply for a certificate of competency, which allows them to identify their individual practice as state certified (Cox & Foster, 1990). Registration does not require individuals to fulfill requirements to practice, but does mandate that those wishing to practice submit their name and information to the state authorities. Employing a practice of free entry and forced exit, violations of the practice may result in revocation of the registration (Cox & Foster, 1990). All three of these types of regulation can also overlap with mandatory disclosure, a regulation placed upon certain professions for consumer protection mandating that practitioners disclose certain information to consumers, such as prior convictions.

Much of economics does not consider occupational licensing. It is assumed that there are few if any barriers to entry in most markets, including the labor market. Occupational licensing is, however, a significant barrier to practicing labor in some fields. The costs in both time and money can prevent, or at least deter, individuals from practicing. These costs are called "transaction costs." Ronald Coase stipulated that market outcomes will be optimal if transaction costs are low enough; it is the purpose of this paper to determine if, in practice, licensure is a transaction cost that creates substantial inefficiency in the labor market for preschool teachers, teachers, and teaching assistants by evaluating licensure as a cost that creates substantial inefficiency in the labor market.

Some argue that occupational licensing solves market failures, specifically asymmetric information in the form of adverse selection. Because the quality of a product is important in many industries, promoting safety and reliability, states pursue occupational licensing to correct the problem of adverse selection by providing a guarantee on the qualifications of the professional (Cox & Foster, 1990). Adverse selection is defined in occupational licensing as an imperfection in the hiring of an individual that comes from a lack of information about the abilities of that individual. For example, by licensing cosmetologists, an individual can be certain that the professional using hair-dyeing chemicals on his or her hair has been fully trained to use them. There is, however, no guarantee that input limits, such as refusing to license a cosmetologist who didn't pass cosmetology school, will necessarily increase the quality of the outcome or product. Adverse selection in this case would be the school having a lack of information about the quality of the teacher until after they have already been hired. By requiring a minimum level of quality, schools can ensure that their educators meet a standard of quality, removing some of the uncertainty on the quality of the educator.

Quality may be even harder to confirm in cases where there is high state to state variation in standards, as is the case in the field of education. For example, some states utilize a written test to determine competency and others require training hours (Cox & Foster, 1990). Currently, a variety of studies find that quality is unaffected by licensing; others have found cases of decreased quality (Cox & Foster, 1990). This would imply that any difficulties placed on educators who wish to migrate would be for naught, as the state would impose an unnecessary cost upon itself without the benefit of stronger classrooms.

Aside from qualitative impacts, strict licensure programs also impose a financial cost. Occupational licensing provides protection for existing practitioners by allowing a degree of monopoly control on the market for educational laborers. Competition from unlicensed practitioners is eliminated by the state licensing requirements and, in terms of migration, competition from licensed practitioners from other states is eliminated as well. The price setting ability of licensed laborers correlates to higher wages; licensing is associated with 14% higher wages on average (Kleiner & Kruger, 2013). Licensing that occurs at the state level sees the highest increase and most consistent effect on wage jumps because this is where the majority of licensure requirements are defined. Two possible reasons for this wage increase are reduced competition and the effort of practitioners to recoup their entry costs (Kleiner & Kruger, 2013). Regulatory boards that interpret the licensing laws are also often made up of existing practitioners and funded by license fees, which may provide a bias in determining licensure requirements (Carpenter et al., 2012). These boards may use their political authority to ensure their own best interests.

Occupational Licensing & Education

In looking at occupational licensing in the field of education, this paper will examine three professions: preschool teachers, grade school teachers (defined as kindergarten through twelfth grade), and teaching assistants. Grade school teachers are the most widely licensed, with mandatory licensing across all 50 states and the District of Columbia. Preschool teachers are licensed in 48 states and the District of Columbia, though with generally less rigorous requirements. Lastly, teaching assistants are licensed in only 29 states (Carpenter et al., 2012). Each of these professions has varying licensure requirements from state to state.

K-12 Teachers

Nationwide, teachers are regulated under a licensure approach, a system that has developed since the nineteenth century. In the early 1800s, those wishing to become teachers had to prove their moral character in front of a local board. Some school boards also required potential teachers to take a general knowledge test. In 1834, Pennsylvania became the first state to require teachers to pass a test of reading, writing, and arithmetic in order to practice. By 1867, this test became common for teachers seeking a state license, and was expanded to include United States history, geography, spelling and grammar (Ravitch, 2003). Still, just before the turn of the century in 1898, only three states issued teacher certificates on a statewide basis (Angus, 2001).

During this period of increasing licensure, training for teachers varied widely by region. Some areas developed public teaching institutes, while other states provided subsidies to private institutes to assist with teacher education. By the early twentieth century, states began to develop higher-level schools of education; it was at this time that some launched specializations. As these institutions became more popular, graduate schools developed and many teachers abandoned

teaching to become leaders of the profession. It was this transition that led to the diminishing involvement of subject-matter professors in favor of professors of pedagogy as a whole (Ravitch, 2003).

In 1921, thirty states still had no requirement for a certificate; by 1930, this number had decreased to twelve. By 1937, forty-one states issued teacher certificates on a statewide basis and five states required a four year degree for their certificate (Angus, 2001). Leaders in the field began to campaign for reform that would professionalize teaching in the manner of law and medicine. The American Council on Education established a National Teachers' Examination in the 1930s, although teaching institutions were largely against this approach. This movement was halted during World War II as there was a severe national teacher shortage; superintendents lost interest in the external subject-matter examinations in their desperate search for teachers (Ravitch, 2003). Today, however, nearly 90% of public school teachers have a standard (versus waivers or vouchers that forego licensure) teacher license. Over 60% of these licensed teachers have a bachelor's degree in education, rather than a particular subject matter. From a policy standpoint, this implies that most teachers already have extensive knowledge of pedagogy, and are not likely to apply these lessons negligently in the classroom.

Preschool Teachers

Preschool, or early childhood education, refers to programming for children under the age of compulsory school (Kamerman, 2006). In the early and middle 19th century, early childhood care began with private charity. Day nurseries and nursery schools developed in the 1830s and focused primarily on the basic care of children (Kamerman, 2006). This emphasis on child *care*, rather than child *education*, remained fairly stagnant over the next century and a half. In the mid-1960s and early 1970s, the declared War on Poverty and the increase in female labor force

participation prompted a greater focus on early childhood education systems. During these years, support for and expansion of these programs increased (Kamerman, 2006).

Although 48 states and the District of Columbia license preschool teachers today (with the exception of Montana and Utah), the licensure varies widely from state to state (Carpenter et al., 2012). State requirements for preschool teachers range from obtaining a high school diploma, two years of college completion or an associate's degree, to a four-year bachelor's degree with coursework in early childhood education (Charles, 2010). There is no national licensure requirement for preschool teachers. As of 2004, fewer than half of preschool teachers in the United States held bachelor's degrees (Charles, 2010). In most states, a high school diploma is the only requirement to teach at the preschool level (Barnett, 2003). Much of state licensing for preschool is based on health and safety training rather than educational programming (Charles, 2010). The difference in educational requirements implies that preschool teachers are going to be less sensitive to the policy changes, as they will not be as directly impacted.

Much of the variation in preschool teacher licensing requirements is due to the variation in types of preschool programs. Nearly 90% of teachers employed in public preschools have a four year degree, but not all preschool programs are housed in public schools. For example, only one quarter of federally funded Head Start teachers have four year degrees in comparison with the public school preschool (Barnett, 2003), though many preschool teachers decide to go beyond this high school diploma requirement. It is important to note that the compensation for preschool teachers is significantly less than that of an elementary, middle, or high school teacher, which may either stem from decreased licensure requirements, or make them of less political interest to ensure their quality with licensure.

Teaching Assistant

A literature search provides very little on the history of the teaching assistant profession, likely because the licensing varies between states and districts. Only twenty-nine states license teaching assistants (also called teacher aides, paraprofessionals, or educational assistants) (Carpenter et al., 2012). Of the states that provide licensure, the educational requirements vary by district and range from a high school diploma to a two year associate's degree. The only common requirement across the United States is for teaching assistants in schools that have Title 1 programs: they must possess a two-year degree, have completed two years of college, or pass a state/local assessment. Similar to preschool teachers, teaching assistant compensation is substantially less than that of an elementary, middle, or high school teacher. The median compensation for teaching assistants is about half that of K-12 teachers, and nearly $4,000 less than preschool teachers (Bureau of Labor Statistics, 2014). These pay figures play into economic theories of occupational regulation and quality by implying that there is a level of educational involvement that states are willing to hire without verifying quality internally with strong licensure requirements.

Interstate Migration in the United States

Over the past few decades, there has been a steady decline in interstate migration within the United States; the rates have been cut in half since 1990 (Kaplan & Schulhofer-Wohl, 2013). This is not part of a cyclical phenomenon, but a long-run trend (Molloy et al., 2013). Though overall migration has declined, the rates of interstate migration are falling faster than intrastate migration, including both inflows and outflows (Molloy et al., 2013). Many may attribute these changes to demographic shifts over time. Although a large portion of within-county migration declines are related to the aging population and rise in homeownership, the decline of interstate

migration is not. Instead, labor market transitions have proven to be a large factor in this migration change (Molloy et al., 2013). There has been a decrease in geographic specificity of occupations, such as wage differentials, and individuals no longer need to move in order to find better jobs. Rising technology has also allowed for increased information sharing about opportunities; individuals are better able to travel and research distant areas without having to move there first (Kaplan & Schulhofer-Wohl, 2013). This implies that all interstate migration is attractive, regardless of policy differences.

Endorsement and Reciprocity

Two of the factors that may influence the desire and ability of licensed workers to move between states is whether the destination state has a reciprocity or endorsement protocol. For purposes of this paper, these terms are defined as follows. Endorsement means that a state accepts an out-of-state applicant to licensure on at least a provisional basis without requiring any additional training or testing. To be eligible for endorsement, an applicant has to be licensed in her current state and, in some cases, be nationally board-certified or meet a minimum years of practice requirement.

Reciprocity, on the other hand, refers to two different but related situations. The first is where two states have a formal agreement that they will accept licensed applicants from the other state without further requirements. The Nurse Licensure Compact is one example of this - all states party to the Compact have agreed to accept nursing licensure applicants from the other party states without subjecting them to further testing or training requirements. The second situation is where a state will accept out-of-state applicants so long as the former state has "substantially equivalent" licensure standards to the new state. A body within the state's

department of education or related agency then makes the determination of whether State A's licensure requirements are "substantially equivalent" to State B's requirements.

If a state has neither reciprocity nor endorsement, out of state applicants must meet the same standards as new applicants to the profession. They would have to complete a state-approved training program, any required examinations, and the like. Essentially, their license elsewhere would be meaningless in the new state.

All fifty states and the District of Columbia have some sort of reciprocity or endorsement scheme for out-of-state teaching applicants. Within each category, though, the degree of reciprocity and endorsement can vary immensely. For example, Maine endorses an out-of-state applicant for licensure who has taught for five of the last seven years so long as she went through a state-approved education program in another state.[4] In North Carolina, an out-of-state teacher with the same amount of experience must be "highly qualified" in their current state and meet North Carolina exam requirements or have National Board Certification in order to be eligible for endorsement (Public Schools of North Carolina, 2002).

Similarly, on the reciprocity side, as of September 2013 44 states and the District of Columbia are signatories to the National Association of State Directors of Teacher Education and Certification (NASDTEC) Interstate Agreement (NASDTEC, 2013). The agreement is intended to ease the mobility of teachers by outlining which states' licenses will be accepted by the admitting state. Yet each state may still customize the agreement to reflect its own standards. For example, Minnesota and Massachusetts are both signatories to the agreement. Minnesota requires a "human relations course including the study of Native American populations" while Massachusetts has no jurisdiction-specific coursework requirement (NASDTEC, 2012). A

[4] Maine Revised Statutes: Title 20-A, §13013 Professional teacher certificate

teacher wishing to move from Massachusetts to Minnesota, then, would have to meet an additional requirement than a teacher moving the opposite direction.

Incentives for Reciprocity. Teacher demand is not consistent across states or within states. Some states have an oversupply of teachers, often in the elementary grades (Beck, 2013). Yet shortages persist in many urban and rural areas, as well as in content areas like math, science, and special education. Reciprocity and endorsement arrangements may be able to help correct this mismatch of supply and demand by helping teachers move to where their expertise is most needed.

At the same time, states may desire to keep out of state teachers from entering the profession in-state and thus not seek reciprocity with other states. One reason for this is that teachers in states with stricter licensing may have higher salaries as a result (Ballou & Podgursky, 2000). Additionally, states may want only the most highly qualified teachers from other states to have the opportunity to receive licensure in their state because they believe teachers with higher qualifications achieve greater educational outcomes.

These protectionist policies have unintended consequences. When the supply of teachers into a state is limited, wealthier school districts are able to better attract the highly qualified teachers who exceed the licensure standards, while school districts which serve primarily low-income populations have a more difficult time recruiting and maintaining teachers (Kleiner, 2010). If a district is unable to hire or retain enough teachers, it may have to eliminate programs or increase class size to compensate, moves that may negatively impact educational outcomes (Kleiner, 2010). This difficulty is particularly sensitive in rural areas of a state, which historically have a difficult time finding qualified teachers.

Teacher Diversity Gap. An additional incentive for reciprocity and endorsement systems is improving the diversity of the teaching profession. Our qualitative analysis below considers diversity through three lenses: diversity of experiences, socioeconomic diversity, and racial diversity. Of these prongs, the racial diversity gap is well documented. The difference between percentage of nonwhite students in public schools and nonwhite teachers in public schools varies widely nationwide from about four percentage points in fairly homogenous states like Vermont and Maine to as high as 43 percentage points in California (Boser, 2011).

A diverse teaching workforce certainly does not guarantee greater educational outcomes and a narrower racial achievement gap (Dilworth & Coleman, 2014). But it can provide a number of other benefits for student achievement. Some evidence suggests that same-race teachers are more effective in teaching students of their respective race (Dilworth & Coleman, 2014). Additionally, teachers of color may be more likely to remain in difficult-to-staff urban schools which often experience high turnover (Dilworth & Coleman, 2014). One can extend these potential benefits to having teachers diverse in other ways as well. Schools with low-income student populations are some with the highest need for teachers (Kleiner, 2010), yet teaching candidates from these backgrounds may be getting fenced out of initial licensure or re-licensure in a new state due to the associated costs. Easing these barriers to entry, then, may help decrease the diversity gap in the teaching profession by allowing states access to a more heterogeneous hiring pool.

Research

The research questions addressed in this paper are:

1. What impact does occupational licensing have on the interstate migration of educational professionals and their employment opportunities?

2. How does that licensing affect the quality of preschool, primary, and secondary educators?

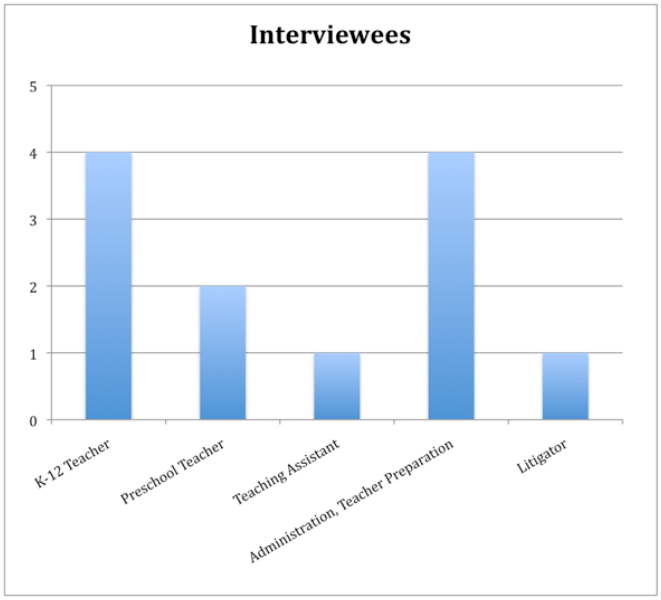
We began with the hypothesis that licensing does have an effect on interstate migration of education professionals. Two methodologies were employed to address the research question. Quantitatively, national datasets are utilized in creation of inverse propensity weighted matching, difference-in-difference, and regression equations to determine effects of licensing on migration. Qualitative approaches, such as personal interviews, discourse analysis, and a literature review, are used to supplement the quantitative findings with unobservable and non-quantifiable characteristics.

3. Qualitative Analysis

Methodology

Literature Review. We conducted a literature review of peer-reviewed academic articles, industry publications and conference materials, and news sources to give context to our discussion of the benefits, challenges, and issues of mobility facing teachers seeking licensure today. These findings are integrated into our analysis below as appropriate.

Interviews. The second source of information related to teacher licensure and mobility were interviews with educational professionals and other stakeholders. Interviews were conducted in-person, over the telephone, and via online web conferencing such as Skype.



We targeted educational professionals with current or past experience as K-12 teachers, preschool teachers, and teaching assistants. Our interviewees were chosen through convenience sampling due to constraints of time and resources. To supplement our sample, we also interviewed individuals involved with teacher preparation, school administration, and representation of out-of-state teachers challenging license requirements. We did this to gain a wider range of perspectives on the mobility piece of licensing, in particular: what do administrators look at when hiring teachers from out-of-state, and what challenges do those teachers face? A visual breakdown of our interviewees is shown above.

Interview procedure. The interview questions were drafted to capture an interviewee's experience with licensure generally as well as licensure changes caused by moving to a new state.[5] Twelve interviews were conducted in total: five in-person, and seven over the phone or web conferencing. Interviewees were informed that their names would be kept confidential. They were not compensated for their participation.

Discourse Analysis. In addition to our interviews, we researched online discourse surrounding issues of teacher licensing and teacher mobility. Our research included online publications such as online newspapers and magazines; social media, such as Twitter and Reddit, and education-related blogs and forums such as Education Week. These sources were analyzed for common themes, tones, and wording to supplement our interviews relating to teacher licensure and mobility.

Limitations. The size and makeup of our interview pool was limited by time, resources, and geographic constraints. Our convenience sample was compiled using personal and professional networks, and eight of our twelve interviewees currently reside in Minnesota. While some of these Minnesota residents have lived and sometimes taught in other states, our results are accordingly limited. Additionally, the results are most saturated with K-12 teacher data because we had the most interviewees with that professional experience. The interview questions were not validated, and some responses may be biased depending on how well-acquainted the interviewee was with the interviewer.

In the future, a larger, random sample of educators from a wider geographic area would provide stronger results and eliminate some of this potential for bias. We would also recommend a series of in-depth focus groups to provide more generalized results.

[5] See Exhibit A, Qualitative Appendix

Both the interviews and online discourse have been analyzed with three themes in mind: challenges of occupational licensing, benefits of occupational licensing, and migration-specific outcomes. Results from both the personal interviews and discourse analysis will be discussed together, as there were many points of overlap.

Challenges. One of the first challenges of licensing is a lack of transparency regarding licensure requirements for educators. Many state departments of education websites are difficult to navigate, and several sources indicate teachers have trouble discerning the courses and tests required to apply for licensure. This is especially pertinent for migrating teachers. Looking at Google trends, for example, we can see significant spikes in searches for "teacher licensure" in Minnesota in 2011 when several of the requirements and tests were changed.[6] One interviewee discussed the case of a married couple, both of whom graduated from Harvard and taught together in the same school district for several years before moving to Minnesota. Upon moving, one wife was able to procure a teacher's license, but the other was not. These two women had the same education, the same experience, and the same credentials, but only one was able to get a license. Neither of them was able to discern a reason for the difference in licensure procurement. These sentiments were reflected in our interviews and research.

> *"I'm open to travel to different states for a job, but I'm running into so much confusion over which states want which kind of testing, licenses, etc."*
> *- Reddit user*

> *"She'd had three years of applications in which she'd been given the run around, and she'd been denied but she'd never been told why she'd been denied."*
> *- Litigator*

> *"I feel like there is an issue where not all states are using the same terminology for the basics."* *- Reddit user*

[6] See Exhibit C, Qualitative Appendix.

Even if licensure requirements are perfectly communicated, these requirements, once uncovered, may not always relate directly to the individual's teaching practice. Many educators report taking courses unrelated to the grades they would be teaching, especially when attempting to obtain a license in a new state. This challenge is often related to the state to state differences in defining early childhood education, primary, and secondary school. Because of state autonomy in education, these distinctions are often drawn at different grade levels. Minnesota, for example, requires secondary educators to be licensed to teach grades 5-12, whereas many others cut off licenses for grades 7-12. Ninth grade teachers from other states, for example, would be required to re-take several courses to become licensed for 5-12 upon moving to Minnesota. Some school districts utilize elementary, middle, and high schools. Others only separate primary and secondary.

> *"When I moved to Maryland, I believe they don't include kindergarten in [elementary school]. It was first through sixth grade, so that [kindergarten] was another test I had to take. It was for early childhood education, because they consider kindergarten early childhood education, whereas in California they didn't."*
>
> *- First Grade Teacher*

Many states compare teacher transcripts rather than experience when determining their ability to obtain a license. Because transcripts often do not reflect all of the skills and credentials gained through years of teaching, licensure requirements may require repetition of courses.

> *"When I was getting my credentials in Maryland, I had to take a class about how to teach reading and writing and by this time...I had been teaching for at least five years. So I thought that was kind of silly and same thing with taking a class about assessments. I thought that was, you know, a waste of time and money too."*
>
> *- First Grade Teacher*

In our interviews, both teachers and litigators consistently used the phrase "jumping through hoops" when describing these two types of challenges. The ability to meet requirements is the only measure reflected by teacher licensing. Passing coursework and standardized tests

does not guarantee classroom success. Some individuals may obtain teacher licenses who, aside from the requirements, may not facilitate children's learning. On the other hand, some otherwise wonderful teachers are unable to meet the licensure requirements due to test anxiety, monetary cost, or other external factors.

> *"I was really weighing whether I wanted to take the time and the money to do that. Was it really worth it to me? I've already done it twice….If I even think about taking a standardized test, I cringe."*
>
> *- First Grade Teacher*

> *"I have friends who are great teachers, but they struggled on passing their Minnesota licensure exams."*
>
> *- Early Childhood Teacher*

Because of the challenges listed above, licensing limits the diversity of the teaching population. When discussing diversity of the teacher population, this paper refers to three elements: diversity of experiences, socioeconomic diversity, and racial diversity. One interviewee gave the example of a woman from California with twelve years of experience who had been given multiple awards for her success in raising classroom achievement rates. Upon moving to Minnesota, she was unable to procure a license due to the difference in requirements. Her success was clearly demonstrated, but she has been unable to teach in a classroom due to the licensure. Her award-worthy classroom success in closing the achievement gap in another state is unable to benefit the Minnesota districts. The interviewee went on:

> *"And that's the problem exactly, is that when you restrict people to those that have the same background of education within the state of Minnesota, you're precluding the variety of educators who, through experience and training, have come from different schools of thought, different types of experience, and, frankly, have different backgrounds...we're losing minority educators and we're losing educators with more experience with minority students because we're not allowing these teachers to move into the state."*
>
> *- Litigator*

Other interviewees spoke about how Minnesota's licensure standards may preemptively fence out minority students from teacher preparation programs:

> *"The data from the analysis of the MTLE basic skills test had indicated that it was closer to only 30% of the diverse candidates or second language candidates that were able to pass the reading, writing, and mathematics test, in spite of the fact that some of those candidates might be entering college first through community college, and then in a regular college setting. They might only need an ACT score of 19 at max to get into their college setting, but through the experience of working through college, their skills come way up. So that test as a use of trying to assure basic competency doesn't necessarily help us recruit, retain and advance students of color or second languages."*
>
> *- Administrator, Teacher Preparation*

> *"Teacher education programs in general have a serious diversity problem. If you walk into those programs, they all look just like you, twenty-one, twenty-two, twenty-three white women. That's it."*
>
> *- Former High School/ESL Teacher*

Lastly, licensure does not address character and fitness. Though there are background checks required to obtain a teacher license, there are fewer official ramifications on licensure status if an individual commits a crime as a teacher than there may be in another licensed occupation like attorney. In California, for example, a teacher was filmed dragging a young girl into the school pool when she refused to participate in gym class. He was given a leave from school pending investigation, but maintains his teacher license (Opposing Views, 2014). Licensed lawyers may be disbarred and prevented from practicing if they exhibited such behavior. A teacher, though, may be fired, but not have his or her license revoked. Considering that the well-being of students is a stated purpose of licensure, it is puzzling that licensure does not consider these factors that could impact children. Of the states that license preschool teachers and teaching assistants, this is a similar concern.

Benefits. It would be negligent to ignore the many benefits of licensure also discovered in the analysis. Several individuals and administrators that we spoke to praised the education

curriculum for teaching pedagogy. It is critical for teachers to know how to teach, not just the subject matter. One administrator we spoke to discussed the clinical experiences portion of teacher preparation, referred to as field experience or student teaching, noting that immersion into the classroom during teacher preparation assists faculty in counseling out individuals who are not suitable for the profession.

> *"I think schools of education, of teacher preparation, do a good job and have a pretty rigorous program. There are two things: if time were not an issue, there are perhaps some classes that would broaden their preparation. The other thing is, there are things that you just can't teach, that you can only learn from experience….Every so often, we'd have students that, once they got out to a classroom, found they didn't like it and that is just as important and useful information. And the other is, we'd put students out there and if we saw someone who was ill-equipped or ill-prepared or ill-suited for it, we would counsel them out of education."*
>
> *- Administrator, Teacher Preparation*

> *"If somebody comes in from out of state, and . . . they've been teaching mathematics, but they didn't have any exposure to teaching reading in mathematics, then that appears as a deficiency and they might have to pick that up."*
>
> *- Administrator, Teacher Preparation*

Secondly, licensing increases the credibility of teachers and institutions by ensuring that the educators have gone through a specific set of requirements. As discussed in the economic implications section, licensing works to resolve the market failure of asymmetrical information. With all teachers in a state undertaking the same base set of requirements, school boards and parents can be assured that anyone hired to teach has at least this set of knowledge. One interviewee described it this way:

> *"Every classroom should have a well-qualified and competent and caring teacher. And that competence isn't just 'I did it for a profession - I was an engineer so I can teach math.' Or 'I was a politician so I can go teach political science.' It's so far beyond that and I think the piece for us is that it isn't enough just to care. So going and grabbing a candidate that has had broad multicultural experiences and claims that they love all kids, that's just the bare minimum. There is a difference between claiming it and the evidentiary proof in a preparation*

> *program of demonstrating time and time again through your practices that you're consistently demonstrating what we know as research-based caring."*
>
> *- Administrator, Teacher Preparation*

Secondary to this is that licensure requirements, specifically the time and cost necessary to complete them, ensure that teachers are dedicated to the profession when they begin.

> *"As an administrator, I need somebody who is going to stay. Looking to fill those shortages with an alternative licensure person who really only has a commitment of two years doesn't help me. I've created a revolving door of training and mentoring and it's expensive for me as an administrator to supervise, mentor, coach, and it's even more expensive if they leave and I have to go find somebody else."*
>
> *- Administrator, Teacher Preparation*

Lastly, licensure provides a measurement tool for qualifications. Regardless of the strictness of any particular licensure regime, its existence in itself provides a way for stakeholders to quantify a teacher's qualifications. Many aspects, both inputs and outcomes, are difficult to measure. Licensing places measurement on at least one input to assist in developing high quality education systems.

Migration. Looking specifically at mobility, it is clear from our research that interstate migration is still occurring. The quantitative methods section below will examine how much these education professions are migrating in depth. Teachers are migrating for at least two reasons. First, many states are still suffering from poor economies and a tight job market. In Michigan, for example, many graduates of education programs are moving to other states in search of teaching jobs. These individuals are more likely to move to a state with reciprocity than one without, as the barriers to licensure are lower.

> *"For me, I wasn't willing to do the extra things when I had worked so hard to get my license the first time and there were plenty of states that had reciprocal licensure."*
>
> *-Reddit user*

"I had reciprocity in New Mexico from Louisiana, no problem. Now, I am moving to Illinois and having to test all over again. I've tried applying online to public schools, and they won't even let you submit without a license and have strongly worded warnings about contacting schools directly."

- Reddit user

Of those we interviewed, however, most often migration occurred for personal reasons, such as moving due to a spouse's job relocating or a familial obligation to elderly parents.

"It's a possibility [of moving to other states] because of my husband . . . . I guess it's not something, whenever we had an opportunity to move, that we've looked into in depth really, just because that wasn't the first consideration."

- Former Preschool, Current Elementary Teacher

Strict and costly requirements may also deter individuals from seeking licensed teaching positions when they move to a new state. Teachers with a public school background, for instance, may choose to seek private school jobs, where a license is not legally required. Others may choose to work as substitutes or teaching assistants, either in lieu of teaching or while the licensure application process is underway. This change in occupation will be reflected on any census documentation collected, which impacts the data analyzed in the quantitative analysis below.

"When I did first move here, I got a job as a teaching assistant because I didn't have my teaching credentials. I went from being a full time teacher to a teaching assistant, so huge pay cut for me for that….at that time I did look into getting my teaching credential here because I wasn't going to live on a teaching assistant salary, but I wasn't sure exactly what I was going to do then. So I did look into it and it was again at least one standardized test and I think I would have had to take some classes, so I was really weighing whether I wanted to take the time and the money to do that."

- First Grade Teacher

One can view licensing as an investment in human capital. If you raise the cost, people will be less likely to undertake the investment. Because of this, there is an interest across the board in higher reciprocity.

"It would be great if Minnesota and Wisconsin would have some sort of reciprocity agreement. I work in a border town and we get a lot of qualified applicants from across the river. We can't keep them though, they have to go back to their state after their student teaching is over. I also think this pool of teachers could also fill content gaps. But, who knows."

- High School Principal

4. Quantitative Analysis

Background

In this section we will explore, from an empirical perspective, how state licensure differences in teaching assistants and teachers impact interstate and intrastate mobility in the United States. We define licensure differences by reciprocity and endorsement regimes by each state. We observe changes in licensure regimes and migration behavior from 2001 through 2012. As stated before, we will try to parse out national declining migration patterns from migration patterns that are a result from licensure within the education profession.

Data

Source. The Integrated Public Use Microdata Survey (IPUMS) has access to both US Census data and American Community Survey (ACS) data. The ACS is filled by a random 1% sample of the US population every year. These surveys cover economic, geographic, and demographic characteristics of individuals. This allows us to control for race, gender, marital status, state, level of education, and other factors that may confound our model. A complete list of the factors we control for will be explained later in our models. IPUMS then provides a 1% random sampling of the ACS data.

Because the American Community Survey is relatively new (2001), there have been changes in the way migration responses are tracked in its short history. This implies that some controls are going to be necessary to make sense of the data, and that these methods, if applied in the future when there is less variance in methodology, might be more accurate. Because our model uses time as a fixed effect,[7] we assume that we sidestep this methodological change. Any

[7] See methods section below.

projections or models that use time as anything other than a fixed effect will need to account for this methodological change.

Limitations of Data. ACS data is limited in its ability to specify occupation, and for this reason, there are some generalizations that need to be made from the quantitative perspective. In many cases, occupations are grouped together where our analysis would be strengthened if we were able to differentiate. The ACS groups together preschool teachers and kindergarten teachers. Preschool teachers refer to pre-kindergarten teachers, programs that are not a part of compulsory education and have varying degrees of occupational regulation. Kindergarten teachers are a part of elementary school programs and often face the same regulation as other elementary education occupations.

Grade school teachers, referring to K-12 educators, also pose a difficulty when defining variables. Because each state designates primary and secondary education boundaries on an individual basis, there is a wide variety as to what is included in these general categories. For example, some states define primary education as K-5 and secondary as 6-12. Others, however, may begin secondary education at grade 5, or include a middle school category of grades 6-9. Because of these wide variations in definition, we cannot differentiate between policy changes that affect different populations of the educational community. Ideally, we would be able to only observe the educators that work in grades that saw a change in policy, but because we do not have such sensitivity, it is necessary to consider primary and secondary educators together.

Lastly, the ACS's cross-sectional survey doesn't allow us to track the changes in individuals over time. Were there a longitudinal component to the ACS, we would be able to control for individual responses to policy changes. Instead, we are forced to assume that the average change in behavior in the occupation given a policy change is sufficient to explain the

impact of the policy. One particular change that would be controlled for in longitudinal data would be the possibility of a change in occupation. The ACS only asks for the occupation of the individual in the year that the survey is filled. If the ACS asked the individual to list all occupations claimed within a certain number of years, we could see if educational professionals were becoming discouraged by occupational regulation and changed their occupation in response to a policy change. Although individuals may list themselves as unemployed teachers, individuals may opt to list themselves as no longer in the labor force and no longer looking for work, or might take up another occupation. Without the ability to control for changes in occupational behavior, we will undercount the number of teachers migrating. This implies that any migration rate we discover in our analysis would be artificially low. It should also be noted that our data is backwards looking in nature. With this come natural limitations that do not allow us to forecast or fully project migration in the coming years within the professions or determine other motivations that might influence the decision to migrate.

Other Implications and Limitations of Data. Our qualitative analysis has led us to believe that there are many factors that determine an individual's willingness to migrate; many of which are not observable and have influence on the eventual outcome migration. One example of this is preference for the specific community of a state. Other factors are potentially observable, but are not available in the ACS database, for example if individuals are moving to states where they already have family ties, or the relationship of their spouse in their migration decision. This suggests that there are going to be large gaps in our data's ability to isolate changes in policy as a determinant of migratory behavior.

Basic Description of Individuals

Age (Figure 1). The education profession is slightly older than the general population. This implies that educators might have more ties to their community than the general population. If educators are older, it is more likely for them to have started a family, and possibly more likely that they have found a place that they are comfortable staying for the long run. As educators are only 1-3 years older than the general population, however, this impact is likely to be marginal.

In terms of policy changes, if educators are older, and less likely to move than younger people in general, then changes in licensing policy in other states is less likely to impact their population as they are less likely to move to that other state in the first place. It is also noteworthy that the spread in ages (the difference between the 75th and 25th percentiles) is slightly smaller for educators, which would imply that educators are slightly more homogeneous than the general population with respect to age.

Figure 1

Age

	25th Percentile	50th Percentile	75th Percentile
Grade School Teachers *	33	45	56
Pre Kindergarten	29	40	51
Elementary and Middle School Teachers	34	46	56
Secondary Educators	34	46	56
"Other" teachers	30	44	57
Special Education	35	46	55
Teaching Assistants	35	46	55
General Population	30	44	55

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

Of the teaching profession, teaching assistants are slightly older than the rest of the teaching population, however they will not exhibit the same behavior as described above because they are a control educator who do not have the same regulations of teacher licensure.

Educational attainment (Figure 2). Grade school teachers are almost two times more likely than the general population to go to college, and more than twice as likely to get a master's degree. Grade school teachers are also almost one third as likely to not complete college as the general population. This might help explain why teachers are slightly older than the general population as well, in that they do not enter the workforce until later in their lives. Because grade school teachers are more educated than the general population, it would imply that normally educators make more money than the general population. However, in the household income portion of demographic analysis, we see that this is not the case. This means that there is no clear relationship with respect to migration and education because the normal relationship is confounded by a unique feature of the teaching labor market.

Figure 2

Educational Attainment (% of occupation)

	12th grade, no diploma	High school, GED, or alternative credential	Some College	Associate's degree, type not specified	Bachelor's degree	Professional degree beyond a bachelor's	Master's degree	Doctoral degree
Grade School Teachers *	0.2	3.6	8.2	3.9	43.4	2.0	37.7	1.1
Pre Kindergarten	0.6	15.7	25.8	13.9	32.6	0.6	10.8	0.2
Elementary and Middle School Teachers	0.0	0.5	3.6	2.1	47.0	2.3	43.5	1.0
Secondary Educators	0.0	0.4	3.2	1.6	44.8	2.2	46.1	1.6
"Other" teachers	0.7	13.1	22.8	8.0	33.8	1.5	18.3	1.8
Special Education	0.2	4.1	6.4	3.6	37.9	1.9	45.1	0.8
Teaching Assistants	1.1	34.0	32.0	12.9	16.3	0.3	3.3	0.1
General Population	1.6	21.1	23.6	8.1	26.6	2.7	14.3	2.0

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

TAs are, however less likely to have completed college than the general population, and more likely to only have either a high school education or some schooling. One explanation for this difference is that some TAs are only working as such until they complete a four year program, at which point they change their occupation to teachers. The only way to quantitatively confirm this is with longitudinal data, but findings in our qualitative data literature review support that around half of TAs fit this description.

This implies the opposite relationship to migration with the general population than was exhibited by grade school teachers. Because they are less educated, they are less likely to earn as much. One might expect that because TAs are more likely to have less education, that they would enter the workforce earlier on and be younger than grade school teachers, but in the Age section, we have shown that this is not the case. This implies that TAs are likely taking on a different profession in their early years and switching to a TA later on. This implies that TAs may be even less responsive to policy changes because they are more likely to be coming from other professions.

Employment status one year ago (Figure 3). All educators are more likely than the general population to be employed. This is not a surprising result, as most educators are employed, and many educators might claim themselves as out of the workforce, or as a homemaker than as an educator. It is also possible that due to the seasonal nature of the teaching profession, that those who do not fill an education position go on to find a different job throughout the year and claim themselves as a different occupation on the ACS.

Figure 3

Worked last year (% of occupation)	Yes	No, but worked 1-5 years ago (ACS only)	No
Grade School Teachers *	89.8	10.2	
Pre Kindergarten	88.1	11.9	
Elementary and Middle School Teachers	90.0	10.0	
Secondary Educators	90.6	9.5	
"Other" teachers	89.1	10.9	
Special Education	90.3	9.7	
Teaching Assistants	87.8	12.2	
General Population	83.8	6.8	9.4

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

It is noteworthy that educators uniformly are more likely to have worked within the last five years given that they are not currently working. If we assume that educators are matched on the same age as the general population, this implies that educators are more likely to remain in the workforce (from a probability standpoint it implies stochastic dominance of employment on age: that given an age, you are more likely to have been recently working). This implies that once educators stop working, they are either more likely to find another job, or that they work in the same job for longer.

From a policy standpoint, it is difficult to interpret this data. If educators are indeed working other jobs, then this database will not capture those changes in migratory behavior as teacher relevant. Another consideration is that if educators have longer careers, they might be less likely to move because they are more likely to be old and more likely to have ties to their community.

Hispanic origin (Figure 4). Educators are more likely to be non-Hispanic than the general population with the exception of TAs and preschool teachers. Generally speaking, there are not many policy implications for Hispanic origin, although it is possible that Hispanics who live in the southwest are more likely to move within a state than between states. Because Texas and California are two of the three most populated states in the US, and because they are also very large in size, Texans and Californians have more options to move within state, which might bias against moving between states and thereby be less sensitive to changes in interstate licensure agreements.

Figure 4

Hispanic Origin (% of occupation)

	Cuban	Mexican	Puerto Rican	Other	Not Hispanic
Grade School Teachers *	0.4	3.7	0.7	1.7	93.4
Pre Kindergarten	0.6	5.5	1.1	2.6	90.3
Elementary and Middle School Teachers	0.5	3.5	0.6	1.5	93.9
Secondary Educators	0.4	3.2	0.6	1.8	94.0
"Other" teachers	0.4	4.1	0.8	2.2	92.5
Special Education	0.3	3.3	0.8	1.5	94.2
Teaching Assistants	0.4	7.6	1.5	3.0	87.5
General Population	0.5	4.5	0.9	2.1	92.1

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

Household Income (Figure 5). Educators uniformly earn less than the general population, despite their higher level of educational attainment (with the exception of secondary educators in the 25th percentile). TAs and preschool teachers earn even less than other educators. This means that controlling on income will be difficult with respect to comparing teachers to TAs because there is such a large gap, that income effects might dominate the ability to migrate over the ability to substitute place of living in one state or another. It is also likely, however, that TA and preschool lower earnings comes from being less educated than teachers on average, as established above. If the qualitative literature review findings are representative of the general population, then TAs are more likely to only be TAs and earn less income for a portion of their lives. Then when they switch over to teachers, they will have more income, and their relative behavior will be comparable to other educators. The fact, however, that TAs are looking for teaching positions might make them more likely to seek education jobs wherever they can (other states) so they might be more willing to move to a state that has more lax policy in order to become a teacher sooner. This would make them relatively more responsive to our policy changes even though TAs would not be directly covered by the changes in the licensure.

Figure 5

Total household Income ($)	Percentile		
	25th	50th	75th
Grade School Teachers *	53,100	81,600	117,000
Pre Kindergarten	37,000	63,000	97,500
Elementary and Middle School Teachers	58,000	85,300	120,000
Secondary Educators	59,000	86,150	121,000
"Other" teachers	38,900	68,000	106,810
Special Education	54,804	82,000	116,020
Teaching Assistants	35,000	59,400	90,000
General Population	58,000	86,900	125,000

* note, Grade School Teacher denotes the behavior of Elementary, Middle, Secondary, "Other," and Special eucation professionals combined

These occupations show similar trends with respect to personal income, so details on interquartile personal income is left out for brevity. We also assume that household income is more related to the choice to move than personal income alone.

Gender (Figure 6). One oddity in our data is that the share of females of the general population seems to be much lower than one might expect. General census numbers show that the US population is much closer to an even distribution of gender than is represented in our control data. This trend is replicated in many different samplings of the IPUMS ACS data, which suggests that perhaps the IPUMS sample of the ACS is biased towards males, or the ACS as a whole is. This complicates our analysis when we want to control for or match on gender because education is an overwhelmingly female profession.

Figure 6

Sex (% of occupation)

	Female	Male
Grade School Teachers *	77.5	22.5
Pre Kindergarten	98.0	2.0
Elementary and Middle School Teachers	80.3	19.7
Secondary Educators	60.3	39.8
"Other" teachers	65.2	34.8
Special Education	86.8	13.2
Teaching Assistants	92.2	7.9
General Population	36.2	63.8

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

Marital Status (Figure 7). Educators are uniformly more likely to divorce than the general population. They are also uniformly less likely to have never been married than the general population (with the exception of "Other" teachers). They are also uniformly more likely to be widowed (this would agree with the findings that educators are older and the conclusion made in the Employment status section that educators have longer careers). Grade school teachers on average are slightly more likely than the general population to be married and TAs are only slightly less likely than the general population.

Figure 7

Marital Status (% of occupation)

	Never married/ single	Married, spouse present	Married, spouse absent	Separated	Widowed	Divorced
Grade School Teachers *	17.6	67.8	1.2	1.3	2.5	9.6
Pre Kindergarten	21.6	63.6	1.5	2.4	2.6	8.4
Elementary and Middle School Teachers	15.0	70.8	1.1	1.2	2.4	9.5
Secondary Educators	17.4	69.0	1.1	1.1	2.2	9.3
"Other" teachers	27.6	56.2	1.5	1.5	3.0	10.1
Special Education	17.1	65.2	1.3	1.7	2.9	11.8
Teaching Assistants	17.5	66.4	1.4	2.2	3.9	8.6
General Population	23.9	67.1	1.1	0.8	2.2	4.9

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

Together, these relationships imply that teachers might have slightly stronger ties to the community and TAs have slightly less strong ties to the community with relatively less and relatively more responsiveness to the policy, respectively.

Number of Children in the Household (Figure 8). Grade school teachers generally have the same number of children as the general population, but preschool teachers and TAs generally have many more children than the general population. This is supported by the findings that TAs are older than the general population. Teachers are less likely to have one child than the general population, but more likely to have more than one child. This also supports the finding that teachers are older than the general population. Having more children, however, is also a strong tie to a certain location, so it is likely that teachers are going to respond slightly less sensitively to the policy because they have more children. That said, the difference is likely to be negligible.

Figure 8

Children in the household (% of occupation)

	0	1	2	3	4	5	6	7	8	9+
Grade School Teachers *	52.6	19.5	19.1	6.8	1.6	0.4	0.1	0.0	0.0	0.0
Pre Kindergarten	42.8	21.4	22.9	9.6	2.4	0.6	0.2	0.1	0.0	0.0
Elementary and Middle School Teachers	51.2	20.0	20.0	6.8	1.6	0.3	0.1	0.0	0.0	0.0
Secondary Educators	55.0	19.2	17.6	6.2	1.5	0.4	0.1	0.0	0.0	0.0
"Other" teachers	63.8	15.6	13.4	5.1	1.5	0.4	0.2	0.1	0.0	0.0
Special Education	50.5	20.9	19.6	6.9	1.7	0.3	0.1	0.0	0.0	0.0
Teaching Assistants	45.1	21.2	21.8	8.7	2.3	0.6	0.2	0.1	0.0	0.0
General Population	51.9	20.7	18.4	6.8	1.7	0.4	0.1	0.1	0.0	0.0

* Note, Grade School Teacher denotes the behavior of Elementary and Middle School, Secondary, "Other", and special education profesionals combined

Methods for calculating relative migration behavior of TAs and teachers with respect to the general population. In order to measure the relative impact of occupational regulation on the teaching profession, we perform a difference in difference analysis with respect to the general population. In this method, we track the migration behavior of an occupation

relative to the number of individuals represented in the occupation in a given year. A model of this can be seen below.

After we have the relative shares of migration behavior within a profession, for a given year, we plot these values over time and form a best fit trend line using R^2 values. We subtract one occupation's trend line from the control (a random sample of the general population) to get a relative change in migration behavior.

$$\text{Migration} = M^{i}_{O,Y}$$

o = Occupation
y = Year
B = Migration behavior options
B = {Interstate Migration, Intrastate Migration, No Migration, N/A}
i = the ith migration behavior (i exists within B)

$$\text{Relative Migration} = \frac{M^{i}_{O,Y}}{\quad}$$

o = Occupation
y = Year
i = the ith migration behavior (i exists within B)
B = {Interstate Migration, Intrastate Migration, No Migration, N/A}

Relative Migration (RM) = RM(O, y, i | i=I, y=Y)

Best Fit Line from R Sqr (BFL) = BFL(RM(O, y, i | i=I, y=2001), RM(O, y, i | i=I, y=2002), ... , RM(O, y, i | i=I, y=2012))

Difference in Relative Migration (DRM) = BFL(y, i, O | O = occupation of interest)
- BFL(y, i, O | O = general population)

Difference in Difference (DID) = DRM(i, occupation of interest, general population, y | year = 2001)
- DRM(i, occupation of interest, general population, y | year = 2012)

This method allows us to contextualize a change in policy because it is assumed that any macroscopic changes will impact both occupations equally, whereas policy differences will only impact one occupation and not the other. Fortunately for us, states have only chose to adopt these policies during the observed time, no states have disbanded these policies, and policy has only changed in one direction.

Below is a representation of the general behavior of the education profession with respect to the general population represented as difference in differences. From this, we notice that the teaching profession is not substantially different to the general population with respect to migration behavior, but that educators with fewer licensure requirements are relatively more likely to migrate between states. This suggests that policy might have a 0.5% impact on interstate migration. We will expand on these differences in the sensitivity section and test this hypothesis in the Methods section.

Regardless of Marital Status			
Within State Migration	1.1%	1.3%	-0.3%
Between State Migration	0.6%	0.2%	0.1%
No Migration	-1.8%	-1.5%	0.1%
Commuting	0.1%	0.1%	0.0%

Methods for Sensitivity Analysis for Marital Status, Children, and Age. As an additional sensitivity check, we limit the population of an occupation (TAs and grade school teachers respectively) to the population that exhibits a certain sensitive behavior. A sensitive behavior is defined as a characteristic that might impact an individual's choice to migrate but has no relationship to the policy directly. For our purposes, our sensitive behaviors are marital status, the number of children that live in the household of the individual, and age. For simplicity, we will only present sensitivity analysis for individuals who we feel will exhibit a sensitive behavior that would not preclude them from responding to a change in policy. For example, rather than

showing all possible number of children one may have, we only show for no children and one child. Measures that are regardless of sensitivity are included at the bottom of each sensitive behavior's difference in difference table as a yardstick for comparison. One benefit of this sensitivity check is that it allows us to observe the relative migratory behavior of a subset of the occupation that might be most responsive to a change in policy. It is assumed that individuals with the fewest limitations are going to be most sensitive to changes in policy and will most closely provide the appropriate metric for analyzing the impact of the policy.

The relative migration patterns of educators with respect to the general population, sensitivity included.

Table 1a: Marital Status

		TA	PreK & K	Grade
Never Married				
	Within State Migration	0.9%	-1.0%	-0.2%
	Between State Migration	1.3%	0.0%	0.5%
	No Migration	-2.3%	1.1%	-0.7%
	Commuting	-0.5%	-0.6%	-0.5%
Married Spouse Present				
	Within State Migration	0.8%	1.8%	-0.1%
	Between State Migration	0.2%	0.1%	-0.1%
	No Migration	-0.9%	-1.8%	0.3%
	Commuting	0.3%	0.4%	0.3%
Regardless of Marital Status				
	Within State Migration	1.1%	1.3%	-0.3%
	Between State Migration	0.6%	0.2%	0.1%
	No Migration	-1.8%	-1.5%	0.1%
	Commuting	0.1%	0.1%	0.0%

For the sake of this sensitivity analysis, it is assumed that the most sensitive members of the occupation with respect to marital status are those who have never been married.

Table 1b: Number of Children

		TA	PreK & K	Grade
No Children				
	Within State Migration	0.6%	0.1%	-0.7%
	Between State Migration	0.9%	0.1%	0.2%
	No Migration	-1.3%	0.1%	0.4%
	Commuting	0.0%	-0.1%	-0.1%
One Child				
	Within State Migration	0.9%	2.5%	-0.3%
	Between State Migration	-0.2%	-0.1%	-0.1%
	No Migration	-0.9%	-2.9%	0.3%
	Commuting	-0.1%	0.0%	0.0%
Regardless of Number of Children				
	Within State Migration	1.1%	1.3%	-0.3%
	Between State Migration	0.6%	0.2%	0.1%
	No Migration	-1.8%	-1.5%	0.1%
	Commuting	0.1%	0.1%	0.0%

For the sake of this sensitivity analysis, it is assumed that the most sensitive members of the occupation with respect to the number of children in the household are those with no children.

Table 1c: Age

		TA	PreK & K	Grade
Age 20-29				
	Within State Migration	2.1%	3.1%	-0.9%
	Between State Migration	-0.4%	0.1%	-0.2%
	No Migration	-3.3%	-4.1%	0.6%
	Commuting	0.3%	0.7%	0.4%
Age 30-39				
	Within State Migration	1.9%	3.6%	-0.8%
	Between State Migration	0.3%	0.2%	0.0%
	No Migration	-2.5%	-3.7%	1.0%
	Commuting	0.1%	0.1%	0.0%
Age 40-49				
	Within State Migration	0.7%	1.4%	0.0%
	Between State Migration	0.0%	0.2%	0.0%
	No Migration	-1.0%	-1.3%	0.3%
	Commuting	0.3%	-0.3%	0.1%
Regardless of Age				
	Within State Migration	1.1%	1.3%	-0.3%
	Between State Migration	0.6%	0.2%	0.1%
	No Migration	-1.8%	-1.5%	0.1%
	Commuting	0.1%	0.1%	0.0%

For the sake of this sensitivity analysis, it is assumed that the most sensitive members of the occupation with respect to age are those in their twenties and thirties.

Implications of the Difference in Difference and Sensitivity Analysis. With respect to intrastate migration, TAs move more often than the general population. Teaching assistants also move more than grade school teachers by a sizable margin (1.4% difference between the two). TAs move between states more than the general population. Grade school teachers move more than the general population as well, but much less so than TAs (the difference here is only a 0.5% swing). Teaching assistants make up for their abundance of within state and between state migration by staying in the same place less often than the general population. Teaching assistants also stay in the same place much less often than grade school teachers (a 1.9% swing). Teaching assistants only commute negligibly more than the general population and grade school teachers commute just as often as the general population (a negligible difference between the two). These relationships are made clear in Table 1a, section "Regardless of Marital Status." The same numbers are replicated in Tables 1b and 1c in their "Regardless of Number of Children" and "Regardless of Age" sections.

It is noteworthy that there is a small difference between teaching assistant and grade school teacher migration between states. With such a large difference in within state migration, one might expect that there would be a large disparity in between state migration as well. The fact that there is not such a large difference would support our qualitative analysis which found that policy was often not the most important factor in choosing to migrate between states. It is also noteworthy that both occupational groups commute so similarly to the general population. This is a similarity we will see dissolve upon sensitivity analysis.

Sensitivity Analysis of Difference in Difference

Marital status. With respect to marital status, we see generally similar relative trends in migratory behavior. One important difference is that single grade school teachers migrate within state less often than the general grade school population, and make up this difference by migrating between states more. This implies that single people are more likely to move in general and would perhaps be more responsive to a change in policy. When in context, single teachers are still moving less than teaching assistants, which implies that the policy might be having a relative impact on grade school teachers. It is noteworthy that the entire educational profession commutes less across state borders when they are single (with respect to the general population). This implies that single people are less willing to commute, but the uniform trend implies policy plays a minor role in the choice to commute.

Children. Grade school teachers and TAs are more likely to migrate between states and much less likely to migrate within a state when they have no children than when they have a child. It is notable TAs are more strongly dissuaded from moving between states once they have a child than grade school teachers. This could be because lack of policy regulation allows TAs more mobility than their grade school counterparts. This relationship is analogous to the trend observed regardless of children, but the fact that the difference is slightly larger implies that TAs might be slightly more responsive to this policy change.

Age. Although educators in their twenties would ideally be the most responsive to policy changes, as they have the fewest ties to their current location to overcome, it is also the case that young people tend to have less money on hand than their older counterparts. Workers in their twenties are still young enough to be training for their occupation, and might be tied to a certain location even though they wish to migrate. It is also noteworthy that during the observed time

period, workers in their twenties faced economic difficulties from the 2005 housing market, the 2008 recession, and the following slow recovery. For this reason, many workers in their twenties were unable to afford to move, and many chose to move back in with their parents after college. For these reasons, it might be more insightful to analyze educators in their thirties.

When we analyzed educators as a whole, we noticed that TAs migrated within state more than the general population, and grade school teachers migrated a little less than the general population. Teaching assistants migrated between states a little more than the general population, and grade school teachers migrated between states only marginally more. When we isolate our focus on only educators in their thirties, two interesting patterns emerge. Educators in their thirties polarize with respect to within state migration. The gap between TAs and grade school teachers widens significantly with respect to within state migration. This might lead us to believe that this gap will widen with respect to interstate migration as well (perhaps because educators in their thirties are eager to move to a community where they can establish ties), however the opposite is true. Educators are more similar to the general population and more similar to each other with respect to between state migration. The polarization in within state migration is reciprocated with respect to those who chose not to move at all. This implies that policy has relatively less impact on those who are early in their career. Perhaps because thirty year olds are young enough to foresee or compensate for policy changes, or perhaps there is something endogenous to the profession that makes teaching assistants want to move within the state more than teachers. It may also be that teacher and teaching assistants school preferences and constraints are highlighted, i.e. teachers are more tied to their specific schools and prefer not to move from their school while seeking tenure, while TAs are more able to move within their district.

Methods

Matching Results - Inverse Propensity Weighted Matching. Our first step in analyzing our data is to use an Inverse Propensity Weighted Matching technique. We isolated the data to within the education sector and the selected professions, stated earlier, to analyze how migration patterns among those in the profession compare to the general public. By matching teachers and teaching assistants to other individuals that look like them in the dataset based on observable characteristics, we attempt to eliminate systematic observational differences between the treated and untreated groups. Utilizing an Inverse Propensity Score Weighted Matching (IPW) technique, we attempt to highlight the differences in migration patterns between the two professions and the general public. Our model for each profession is the following:

$$Y_{it} = \beta_0 + \delta * OCC_{it} + n_t + \varepsilon_{it}$$

where $Y_{it}$is the indicator for migration (moved within state, moved between states, or both),

Occ_{it} is the indicator for being in one of the two occupations,

n_t include year fixed effects,

and ε_{it} is the error term.

We matched individuals on education, age, sex/gender identified, marital status, citizenship status, number of own children in household, family size, and employment status. Again, the goal is to identify how individuals within the professions we are looking at migrate when compared to other individuals of the general public. We make several assumptions utilizing any matching system, particularly the assumptions that we have matched on all observable characteristics and that unobservable characteristics, such as motivation, are irrelevant to our analysis. It should be noted that not accounting for these unobservable characteristics can bias our estimates and outcomes but it is also challenging to quantify

characteristics such as motivation into a regression. We found this to be true in our qualitative analysis in which individuals stress that external motivations, "unobservables" so to speak, drove a large portion of their reason to move, not strictly licensure requirements of a particular state, though still a factor in the migration calculation that individuals and households face.

Using an IPW model, highlighted earlier, with a probit as the matching indicator, we find professionals in these two groups have different migration patterns than those of the general public that they were matched on. Initial results of this study find that teachers are 1.83% less likely to move from their current residence from a year ago, when compared to individuals that they were matched on using IPW. Further, teachers are 0.44% less likely to move out of state and 0.11% less likely to move within their state when compared to individuals that they were matched on using IPW. Our preliminary results for the teaching profession were statistically significant at a 0.01 level. Again, these results match our initial analysis of the profession: older and more settled individuals. We found very similar results for individuals that were teaching assistants as well.

Table 3: Inverse Propensity Weighted Matching

	Any Movement	**Move out of state**	**Move within the state**
Teachers	-1.83% (0.0009)	-0.44% -0.0009	-0.11% (0.0009)
Teaching Assistants	-0.94% (0.00047)	-0.53% (.00047)	-0.40% (.00046)
Controls	X	X	X
Year Fixed Effects	X	X	X
N	1,786,627	1,786,627	1,786,627

The teaching assistant profession, like teachers, also appears to be less mobile when compared to other individuals in the general public. Our initial results show that teaching assistants are 0.94% less likely to move from their current residence from a year ago, when compared to individuals that they were matched on using IPW. Further, teaching assistants are 0.53% less likely to move out of a state and 0.40% less likely to move within their state when compared to individuals that they were matched on using IPW. The results for both teaching professions were statistically significant at the 0.01 level. Table 3**,** above, summarizes the findings for each profession in greater detail.

A comparison between the two professions highlights significant difference in migration: teaching assistants, though still less mobile than the general population, tend to be more mobile than teachers in all migration patterns except movement within a state. When it comes to movement within a state, our results show that teachers tend to be more mobile than teaching assistants but still less mobile compared to individuals they were matched on. This disparity may be due to systematic differences, both observable and unobserved, between the two professions (household salary, number of children, family size, others) or potentially the effects of a lack of reciprocity with neighboring states. Though it is difficult to tease this out, we can preliminarily say that these results align with our initial assessment of these two professions: older, tend to be or have previously been married, not the primary breadwinner in the household/secondary income stream, and more settled. Additionally, the qualitative analysis showed that a portion of the teaching assistant population is composed of teachers licensed elsewhere who are in transition to a full time teaching position. Given this added information that individuals may wait to move for jobs as teachers, we see there are several variables that affect these results.

Simple Regression. Our second step of this analysis takes the form of a simple regression model with fixed effects to control for yearly changes in the data and controls for the same variables outlined in the IPW matching section in our analysis (education, age, sex/gender identified, marital status, citizenship status, number of own children in household, and family size). Utilizing a basic regression model, which is specified below, we start to see the impact of licensure on the selected profession. Our models are as follows:

$$Y_{it} = \beta_0 + \delta_1 ENDORSE_{it} + X_{it}\beta + n_t + \varepsilon_{it}$$

$$Y_{it} = \beta_0 + \delta_2 RECIP_{it} + X_{it}\beta + n_t + \varepsilon_{it}$$

where Y_{it} is indicator for teacher or teaching assistant moving out of a state

$ENDORSE_{it}$ and $RECIP_{it}$ are indicators for endorsement and reciprocity in that state that an individual resides in,

$X_{it}\beta$ are controls (age, education, marital status, sex, number of children, employment),

n_t are year fixed effects,

and ε_{it} is the remaining error term.

Our preliminary results underscore our hypothesis that endorsement and reciprocity have an impact on the migration of the two professions. As highlighted by Table 4 below**,** the two

Table 4: Licensure Impact by Profession, 2000 – 2012

	Teaching Assistants		Teachers	
Endorsement	0.0111	0.0108	0.009	0.009
	(9.0 e-4)	(9.0 e-4)	(4.0 e-4)	(4.1 e -4)
Reciprocity	0.0086	0.008	0.0108	0.0103
	(9.4 e-4)	(9.4 e-4)	(4.3 e-4)	4.3 e -4
Controls		X		X
Year FE	X	X	X	X
N	114,628	114,628	659,974	659,974

professions are clearly impacted by different forms of licensure. Generally speaking, teachers and teaching assistants respond positively to states with reciprocity and/or endorsement but at different magnitudes. Our preliminary finds shows that for a teacher, a state having reciprocity increases the likelihood of your moving out of your current state by 0.0103 from a -0.0120 baseline, a difference of 0.0104 percentage points. Similarly, given that you are a teaching assistant, a state having reciprocity increases the likelihood of you moving out of your current state by 0.008 from a baseline of - 0.0120, i.e. a difference of 0.0081 percentage points. The findings in our simple regression model for teachers were statistically significant at the 0.01 level.

Given that you are a teacher or a teaching assistant, reciprocity increases the likelihood of you moving out of your current state by 0.5% from a baseline of 0.6% and 0.4% from a baseline of 0.5%, respectfully. On the converse, a state's endorsement decreases the likelihood of you moving out of your current state by 0.3% and 0.2%, given that you are a teacher and teaching assistant, respectfully. Again, our preliminary results underscore that a state's reciprocity and endorsement, though small, do influence the teaching and teaching assistant professions mobility. The findings in our simple regression model for teaching assistants were statistically significant at the 0.01 level.

A comparison between the two professions highlights significant difference in how each responds to different forms of licensure. We find that teaching assistants tend be more responsive to states with endorsement rather than reciprocity while teachers are more responsive to states with reciprocity than endorsement, though both respond positively to either form of licensure. This disparity may be due to systematic differences in preferences between the two professions and/or the effects of different forms of licensure in states. Though preliminary, we can say that

these results align with our initial assessment of licensure: licensure requirements induce certain professions to move more than others and licensure had different pulls on certain professions. Referring back to the qualitative discussion on licensure requirements, these differences may be attributable to the fact that teacher licensure has far more requirements than teaching assistants. Furthermore, teaching assistants are not licensed in 21 states, reducing the need for endorsement or reciprocity when selecting locations.

Multi-Period Difference in Difference Model. The last model utilized is a multi-period difference in difference model with fixed effects applied. This model looks to address how state level policy changes in reciprocity and endorsement influence migration patterns within the professions over time from 2001 to 2011. Our model is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 Occ_{it} + \beta_2 AFTER_{it} + \delta Occ * AFTER_{it} + X_{it}\beta + n_t + \alpha_{it} + \varepsilon_{it}$$

where Y_{it} is indicator for moving out of current residence,

Occ_{it} is indicator for being a teacher or teaching assistant,

$AFTER_{it}$ is indicator for implementation of policy change (either endorsement or reciprocity),

$X_{it}\beta$ are controls (age, household income, marital status, sex, number of children, employment status),

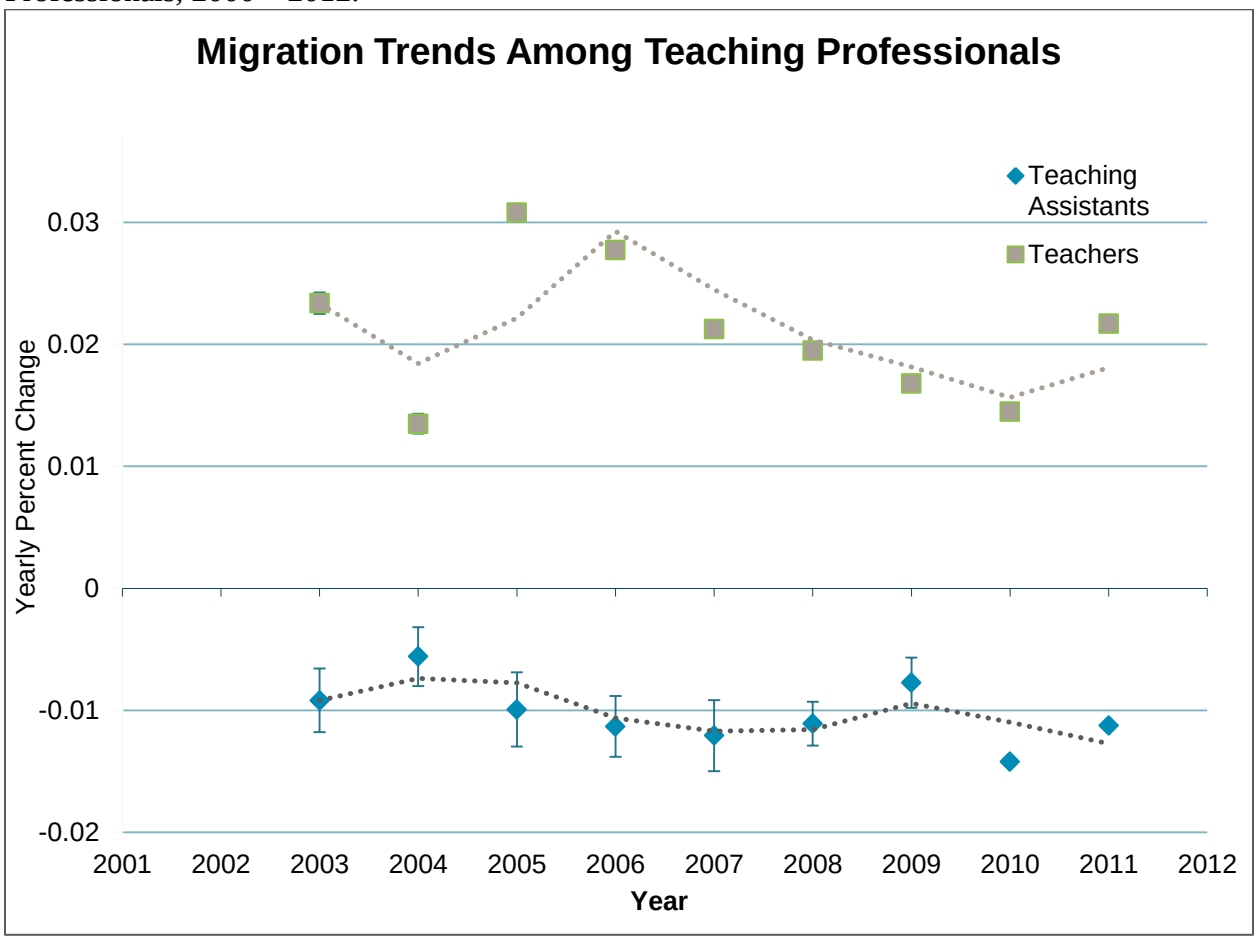
$n_t$are year fixed effects, and

and δ is the DID estimate of interest for each year.

Our preliminary results highlight and underscore our hypothesis that the impact of licensure over time on both professions is small but significant enough to change the overall trends in migration for both professions, within reason. The first of our analyses focuses on state level reciprocity expansion impacts on migration. Our results show two differing trends among

teachers and teaching assistants. Looking at **Graph 1**, which plots DID estimates from 2001 to 2011, overall trends for teachers hover around 0.02% on a consistent basis, except for variations in year 2004 through 2006.

Graph 1: State Level Reciprocity Change's Impact on National Migration Among Education Professionals, 2000 – 2012.



Data Source: IPUMS - University of Minnesota.

***Note**: We utilize a multiple period difference in difference model with fixed effects (state and year), and controlled for other covariates. Our analysis focused on how state level changes in endorsement, in this case an increase in reciprocity, change yearly migration trends within the profession. Endorsement changes occurred continuously from 2002 to 2005, then again in 2011.The error bars are robust standard errors. Additionally, 2000- 2002 indicators were removed due to multicollinearity and model specification issues.*

These variations in the data may be in part due to state expanding reciprocity with other states in 2003 and 2005. Though we see these spikes as states start to expand reciprocity the overall migration trends among teachers is downward trending suggesting that though reciprocity does

have a positive effect on migration, policy changes are not inducing those in the profession to move over the long term.

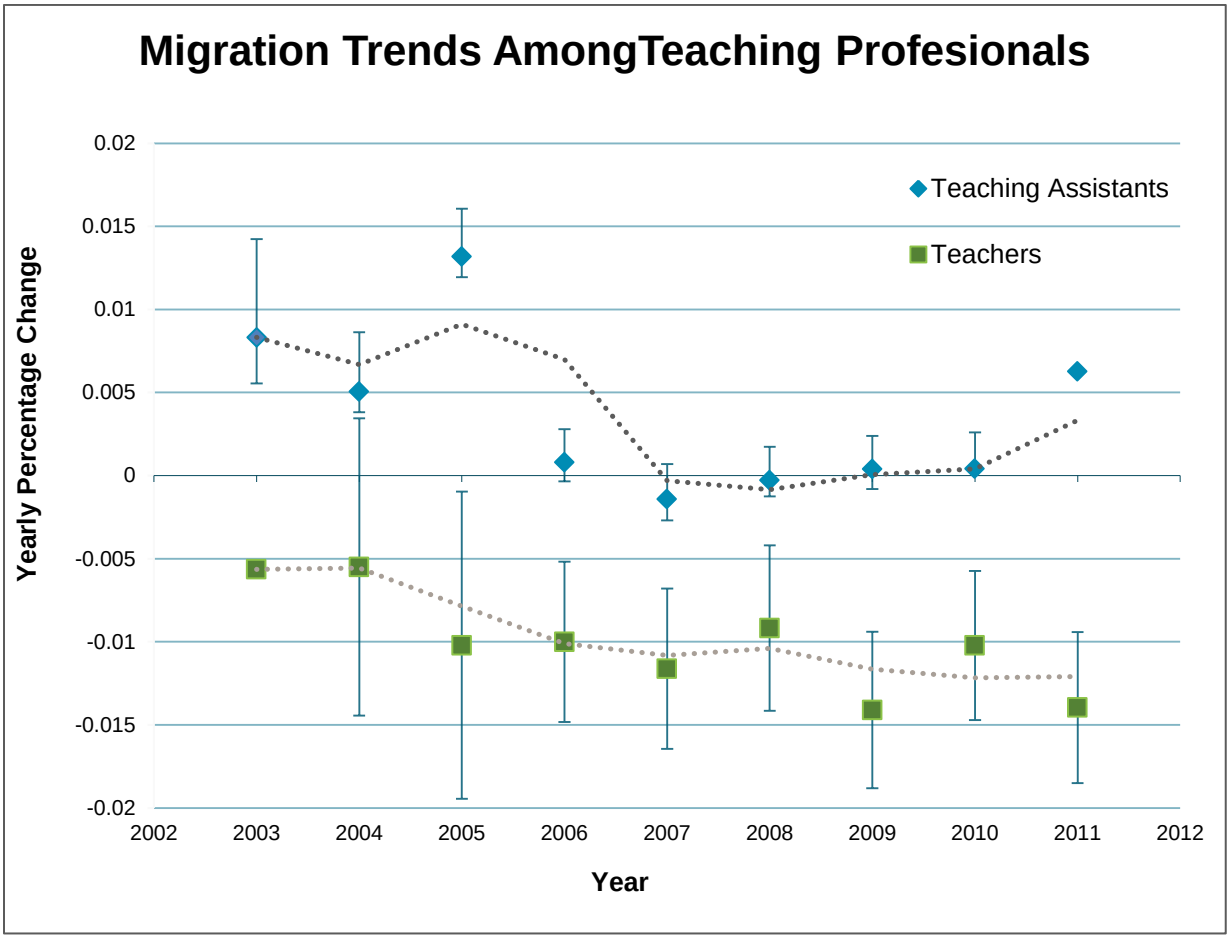
Teaching assistants, on the other hand, seem to remain significantly affected by the state level policy shifts. In fact, we find that trends for teaching assistants is consistently negative, implying that the profession is less responsive to state level reciprocity changes. A preliminary explanation for this negative trend alludes to our earlier analysis in which teaching assistants are less responsive to reciprocity when compared to teachers. Again, this circles back to the lack of any teaching assistant licensing in 21 states, reducing the need for reciprocity status.

The second piece of our analysis looks at how state level endorsement expansions impact both professions. Before moving forward, it should be noted that major changes in endorsement occurred in four consecutive years, 2002 to 2005, then again in 2011.

Preliminary results obtained from the impact of endorsement changes, much like the overall trend for changes in reciprocity outlined earlier, underscore our overall hypothesis: licensure has a small but statistically significant impact on migration patterns on both professions over time. We find that though small, the changes are enough to temporarily change the overall trends in migration for both professions. Overall our results show that trends for teaching assistants and teachers are downward trending following expansions in endorsement, except for small jumps in 2005 and 2011. The jumps in the trends for both professions can potentially be long-term effects in which individuals did not immediately respond to endorsement expansions. Though state expansion in endorsement signals loosening of policy, which we would hypothesize to increase migration, our results highlight endorsement changes at the state level seem to have downward impacts on teacher and teaching assistant migrations over time. These results are consistent with current literature on national trends, e.g. Dr. Schulhofer-Wohl's

Understanding the Long-Run Decline in Interstate Migration article on interstate migration and the declining in interstate migration. **Graph 2, below,** highlights this trend for both professions plotted over time.

Graph 2: State Level Endorsement Change's Impact on National Migration Among Education Professionals, 2000 – 2012.



Data Source: IPUMS - University of Minnesota.

***Note**: We utilize a multiple period difference in difference model with fixed effects (state and year), and controlled for other covariates. Our analysis focused on how state level changes in endorsement, in this case an increase in endorsement, changes yearly migration trends within the profession. Endorsement changes occurred continuously from 2002 to 2005, then again in 2011. The error bars are robust standard errors. Additionally, 2000- 2002 indicators were removed due to multicollinearity and model specification issues.*

5. Summary of Findings

Teachers experience generally the same migration as the nation as a whole. Reciprocity or endorsement status may not affect how many teachers move in total, but it does affect *where* teachers move when given the choice. Licensed teachers who move in search of a job opportunity are more likely to select states with reciprocity, as the transition barriers and requirements for obtaining licensure are reduced. For this reason, states may see 1.8 percent higher in-migration rates than others if they hold reciprocity with multiple states.

It is clear from our research that many teachers who are migrating across state lines are doing so because of personal reasons, such as a spouse's job opportunities or a familial obligation to elderly parents. As our quantitative analysis has shown, teachers and teaching assistants are less likely than the general population to move and are more inclined to move to states with reciprocity and/or endorsement but many unobservable characteristics, as outlined above, have stronger influences on migration patterns. In this case, the individual does not have a choice on location. It is more likely in this scenario, when location is not a choice, that a teacher may leave the profession either temporarily or permanently. Licensed grade school teachers moving to a state with strict licensure requirements may choose to work instead as a teaching assistant, a substitute teacher, or leave the education profession altogether. The quantitative analysis is unable to account for these factors, as "former occupation" is not currently measured by the American Community Survey.

Profession Differences

There was a lack of results for the preschool professional as a whole; this is likely due to limitations of the dataset. As mentioned, the ACS does not distinguish between preschool and kindergarten teachers. For the purposes of this study, even if separation of the variables were possible, the sample size of preschool teachers is too small to produce significant results.

Similarly, though the ACS does distinguish between primary and secondary educations, each state draws these definitions at different grade levels. Because of these variations across states, this study grouped grade school teachers into one variable. Future review may seek to separate teachers further based on these grade level distinctions.

It should be noted that demographic differences in the profession play a large role in migration. Because teachers tend to be slightly order and less likely to be single, among other facts, make the profession less mobile and more rooted in their community. Additionally, our study finds that these individuals are less reactive to state level policy shifts like reciprocity and endorsement expansions.

There were several confounding, unobservable factors that this study is unable to account for quantitatively. In addition to the motivations for moving and migration location choice discussed above, there are often other reasons that individuals move in and out of the education profession. Teaching assistants may more often transition to fully licensed teachers, as many interviewees indicated they had done upon receiving their license. Individuals who do move may leave the profession due to poor job opportunity, strict licensure, or personal reasons, in which case the data does not accurately reflect the migrating teacher population. Unobservable characteristics are always a concern with quantitative research, and this study has done its best to account for these with qualitative methods. Some of these, already highlighted above, are: spousal job decisions, motivation to live in a certain state/area of the country, and participation of individual union memberships, among many more.

Potential Policy Implications

It is important that policymakers take note of the ways occupational licensing affects interstate migration. If occupational licensing is causing a barrier to entry, excluding credible

professionals from their desired career, we have a case of market failure. Strict licensing enforces protectionism by reducing competition, which may increase costs, both to professionals and consumers. State authorities must carefully weigh these costs of protecting their labor markets (Kleiner, 2010). If deemed too costly, states have the power to adjust occupational regulation to better reflect a balanced labor market. Additionally, it would be beneficial for state legislators and policy makers to provide clear, transparent information on future reciprocity and endorsement changes. Providing individuals and the general public more complete information on reciprocity and endorsement changes would allow individuals to make more well informed and secure decisions in determining whether to move out of a state or not.

Overall, licensure decisions remain at the state level and have the potential of impacting 666,000 of the projected 3.7 million teachers teaching in the U.S. as of 2012 (U.S. Department of Education - National Center for Education Statistics). Because of this, there is difficulty in assessing the costs and benefits of teacher regulation, especially in regard to migration. While teacher shortages are a pervasive problem in many areas, it is not an omnipresent issue across every state of the nation. The incentive, then, for reciprocity, is not to fulfill a teaching shortage as such policy would not address the shortage identified by Rosen (2012) in our introduction section. Reciprocity and endorsement will have relatively small effect of mitigating the barrier to entry for out of state workers. Research demonstrates that competition is beneficial for teachers and students, from both an economic and educational outcomes perspective. This is shown by the fact that reciprocity continues to increase, not decrease, with time. A diverse hiring pool provides benefits in terms of increased experience and different perspectives on methodology. We may be concluding that reciprocity and endorsement may have some impact on teacher mobility, but this impact is relatively small. This implies that policy changes are going to be marginal, and

licensure will have a relatively small impact on teacher diversity and teacher availability. If schools wish to expend to solve these problems, reciprocity and licensure may not be the first areas to address.

6. Future Research Recommendations

To supplement the research conducted above, we had planned to provide a detailed case study on Minnesota. This would provide an in depth look at particular licensing requirements in a state with extremely strict standards for in-migrating teachers. Due to time and data constraints, this could not be fully executed or examined. It is recommended that future research look to state-specific results, particularly in states with occupational licensure on opposing ends of the spectrum in terms of strictness.

This would require connections to qualitative information about the intensity of the licensure process, including controls for the grade levels in which state licenses are applicable, the duration of residency clinical experiences and access to data on both when a teacher is hired and when a teacher is offered a position. Both of these measures are necessary controls to account for, as many teachers are hired late in the hiring season based on last minute demands. These last minute demanded teachers are going to over represent the non-migratory population (in terms of using hired teachers to measure the response of the policy), as only those who are most immediately available to move are going to be able to accept the position.

If, for example, a teacher is made an offer to work at a school the week before classes start, it is likely that only teachers who already live nearby are going to be able to accept the offer, and the policies that would impact interstate migration would have no relevance. If, however, you are able to compare only on the teachers that were made offers well in advance of the school year, then you can match migratory educators with non-migratory educators. This comparison would be more appropriate, as there would now be enough time to allow those who live in other states to consider the position and move to the necessary location, rather than being constrained by the population of teachers that are already near the school.

It also would be prudent to consider resampling the ACS and test the empirical results across samples. Given that our IPUMS data is a 1% random sample of ACS data (which is in turn a 1% random sample of the general population), it is possible that our IPUMS sample represents bias with respect to the general population. If you are able to draw from a different 1% sample of the ACS then you can replicate our methods to ensure that the findings are consistent. It would be particularly helpful to gather this data after more time has passed since the inception of the ACS, as recent changes in methodology make it more complicated to engage controls because the metrics for the controls are still being ironed out and changed halfway through our observation time period. That said, there appears to be a male bias in the IPUMS ACS data with respect to the general population, so one may consider using a different database that does not have such a bias.

Given the qualitative limitations in data, specifically the geographic restrictions of interviewees, it is recommended that further studies be conducted using national random samples or longitudinal panel data, if possible. The benefit of longitudinal information is that it would allow us to isolate the dataset to the same individuals over time, i.e. longitudinal data would allow us to monitor certain individuals within the profession over time and allow for more in-depth analysis. Additionally, longitudinal data can potentially provide us more robust and accurate results. Adjusting for greater comparison across professions would also strengthen the results. Our findings suggest there may be competing influences on both teacher success and educational outcomes; deeper examination of community and diversity elements that contribute to these measures of educational licensing success. Though unable to do so in this study, we suggest parsing out preschool and kindergarten in order to understand the effects of licensure on

the professions. In the IPUMS dataset, the two professions are lumped together and cannot be disentangled for analysis.

References

Angus, D. L. “Professionalism and the Public Good: A Brief History of Teacher Certification.” Thomas B. Fordham Foundation (2001). Print.

Anonymous (Administrator). Personal Interview. 3 Dec. 2014.

Anonymous (Administrator, Teacher Preparation). Personal Interview. 21 Nov. 2014.

Anonymous (Administrator, Teacher Preparation). Personal Interview. 30 Nov. 2014.

Anonymous (Elementary Teacher). Personal Interview. Oct. 2014.

Anonymous (First Grade Teacher). Personal Interview. 5 Nov. 2014.

Anonymous (Former High School/English as a Second Language Teacher). Personal Interview. 27 Oct. 2014.

Anonymous (High School Principal). Personal Interview. 31 Oct. 2014.

Anonymous (Kindergarten Teacher). Personal Interview. 5 Dec. 2014.

Anonymous (Litigator). Personal Interview. 29 Nov. 2014.

Anonymous (Preschool/Elementary Teacher). Personal Interview. 2 Nov. 2014.

Anonymous (Preschool Teacher). Personal Interview. Nov. 2014.

Anonymous (Teaching Assistant). Personal Interview. 3 Dec. 2014.

Ballou, D. & Podgursky, M. "Gaining Control of Professional Licensing and Advancement," in Tom Loveless, ed., *Conflicting Missions? Teachers Unions and Educational Reform*. The Brookings Institution (2000).

Barnett, W. S. “Better Teachers, Better Preschools: Student Achievement Linked to Teacher Qualifications.” NIEER Preschool Policy Matters, Issue 2 (2003). Print.

Beck, E. “K-5 teacher overload: Too many trained, not enough jobs.” (February 19, 2013). Retrieved December 18, 2014, from

http://www.usatoday.com/story/news/nation/2013/02/18/oversupply-elementary-education/1917569/.

Boser, U. "Teacher Diversity Matters: A State-by-State Analysis of Teachers of Color." Progress 2050, Center for American Progress (2011). Web.

Bureau of Labor Statistics. "Teaching Assistants: Occupational Outlook Handbook." United States Department of Labor, n.d. Web. 15 Oct. 2014.

"California Gym Teacher Charged After Footage Surfaces of Him Dragging Student into a Pool." Opposing Views. Web. December 18, 2014. http://www.opposingviews.com/i/society/california-gym-teacher-charged-after-footage-surfaces-him-dragging-student-pool-video.

Carpenter, D. M., Knepper, L., Erickson, A. C., & Ross, J. K. "License to Work: A National Study of Burdens from Occupational Licensing." Institute for Justice (2012).

Charles, S. B. "An Examination of Licensure: Examining the Effect of Licensed and Non-licensed Teachers on the Oral Language Development of Preschool Students in One Public School District's Program" (2010). Electronic Theses, Treatises and Dissertations. Paper 3883.

Coase, R. "The Nature of the Firm." Economica 4(16) (1937).

Coleman, M. J., & Dilworth, M. E. "Time for a Change: Diversity in Teaching Revisited." National Education Association (2014). Web. Retrieved December 18, 2014, from http://www.nea.org/assets/docs/Time_for_a_Change_Diversity_in_Teaching_Revisited_(web).pdf.

Cox, C., & Foster, S. "The Costs and Benefits of Occupational Regulation." Federal Trade Commission: Bureau of Economics (1990). Web.

Education Week: Blogs. Editorial Projects in Education. Web. 5 Dec. 2014.

Google. *Teacher License Minnesota.* 2014. Google Trends. Web. 4 Dec. 2014.

Kamerman, S. B. "A Global History of Early Childhood Education and Care." Education for All Global Monitoring Report (2006). Web.

Kaplan, G., & Schulhofer-Wohl, S. "Understanding the Long-Run Decline in Interstate Migration." Federal Reserve Bank of Minneapolis: Research Department Working Paper 697. December 2013.

Kleiner, M. M. "Enhancing Quality or Restricting Competition: The Case of Licensing Public School Teachers." University of St. Thomas Journal of Law & Public Policy (2010).

Kleiner, M. M., & Krueger, A. B. "Analyzing the Extent and Influence of Occupational Licensing on the Labor Market." NBER Working Paper No. 14979. May 2009.

Loveless, T. "Conflicting missions?: Teachers unions and educational reform." Washington, D.C.: Brookings Institution Press, 2000.

Molloy, R., Smith, C. L., & Wozniak, A. "Declining Migration within the U.S.: The Role of the Labor Market." The U.S and Economics Discussion Series: Divisions of Research & Statistics and Monetary Affairs. Washington, D.C.: Federal Reserve Board, 2013.

National Association of State Directors of Teacher Education and Certification (NASDTEC). "Signatories to 2010-15 Interstate Agreement." (2011). Web. 1 Dec. 2014.

Public Schools of North Carolina. "Beginning, Out of State, & International Teachers." State Board of Education: Department of Public Instruction. http://www.dpi.state.nc.us/licensure/beginning/. 1 Dec. 2014.

Rabben, L. "Credential Recognition in the United States for Foreign Professionals." Migration Policy Institute (2013). Web.

Ravitch, D. “A Brief History of Teacher Certification.” White House Conference on Preparing Tomorrow's Teachers. Washington, D.C.: United States Department of Education, 23 August 2003.

Reddit. Reddit Inc. Web. 5 Dec. 2014.

Rosen, R. (2012, January 1). Shortage Field Incentives: Impacts on Teacher Retention and Recruitment. Retrieved December 18, 2014.

Ruggles, S., Alexander, J.T., Genadek, K., Goeken, R., Schroeder, M.B., & Sobek, M. Integrated Public Use Microdata Series: Version 5.0 [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

U.S. Department of Education, National Center for Education Statistics. Digest of Education Statistics, 2012 (NCES 2014-015), Introduction and Chapter 2. (2013).

Qualitative Appendix

Exhibit A: Interview Structure Guide

1. Introduction to Project and Personal Overview
2. Name and University of Minnesota, Humphrey School affiliation.
3. Explain the research project including overarching questions and goals.
4. Explain the importance of this research in personal and larger contexts.
5. Explain risks and benefits for participation; explain confidentiality and volunteering.

Establish Rapport with Interviewee

1. Please tell me how you chose your profession; what personal factors influenced your choice to participate in education (what school they attended, where they are from, where they worked, did they like it, not like it?).

Licensing

1. Tell us a little bit about your credentials? What are they, where are they from? Elaborate.

    Licensed? Y/N Where (State & Authority)

    If yes, explain process for obtaining license

    If no, do you plan on seeking licensure?

2. Where do you currently work
3. Do you think licensing requirements reflected your ability to teach? If so, how?

Location & Migration

1. What states have you worked in as a teacher/assistant/administrator?
2. Tell us a little bit about your employment in (X) State.
3. If moved, why? Explain.
4. Do you plan on moving [again] in the future? (determines mobility issues).
5. If so, would you work towards obtaining a license in the new location?
6. How has licensing played a part in your career choice(s)? (emphasis teaching assistant)
7. How do you anticipate licensing will play a role, if at all, in your career in future years?
8. If you do not have an immediate plan to return to teaching, are you aware of the licensing requirements needed to meet?

Administrators

1. What role does licensing play in your decision to hire or retain somebody?
2. Does it make a difference whether an applicant is already licensed in-state?

3. Is there a particular geographic location that you prefer to hire from?

4. Do you receive a diverse group of applicants?

5. Does licensing play a role in the diversity of the teaching population in your area?

6. Do you hire non-licensed or temporarily licensed teachers? (waivers/vouchers)

7. Is there a process or timeline for these individuals to obtain their license?

8. Are certain subjects more likely to require hiring these individuals?

Conclusion of Interview

1. What is the most important thing you would like me to take away from this interview?

2. Is there any important questions that you wish I had asked?

3. Sincerely, thank you for your participation in my research project, it is greatly appreciated.

Exhibit B: Interviewee Licenses by State

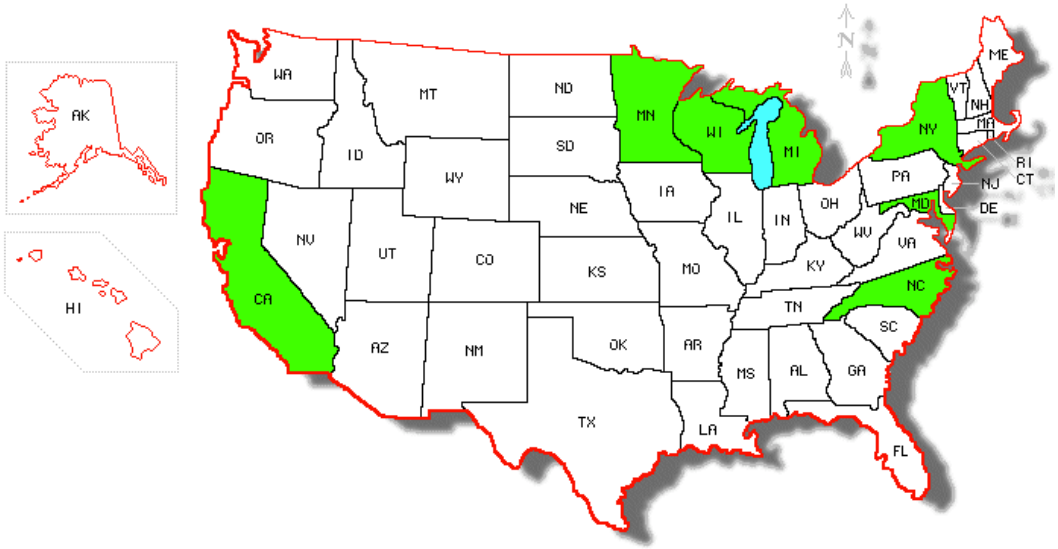
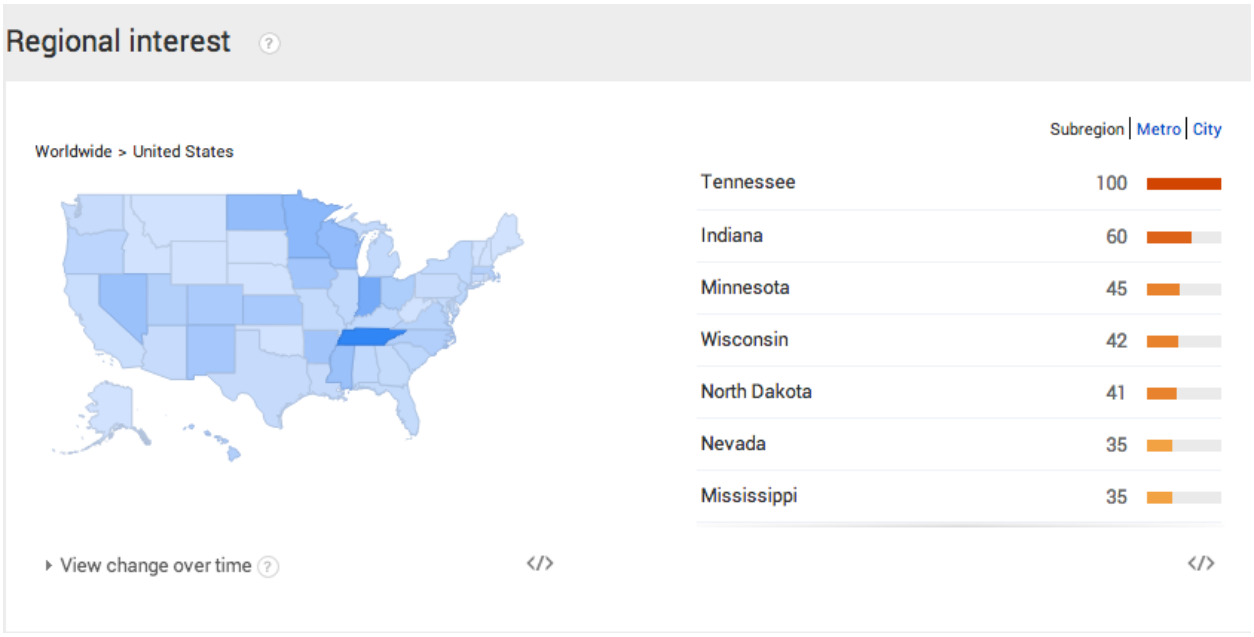


Exhibit C: Google Trends



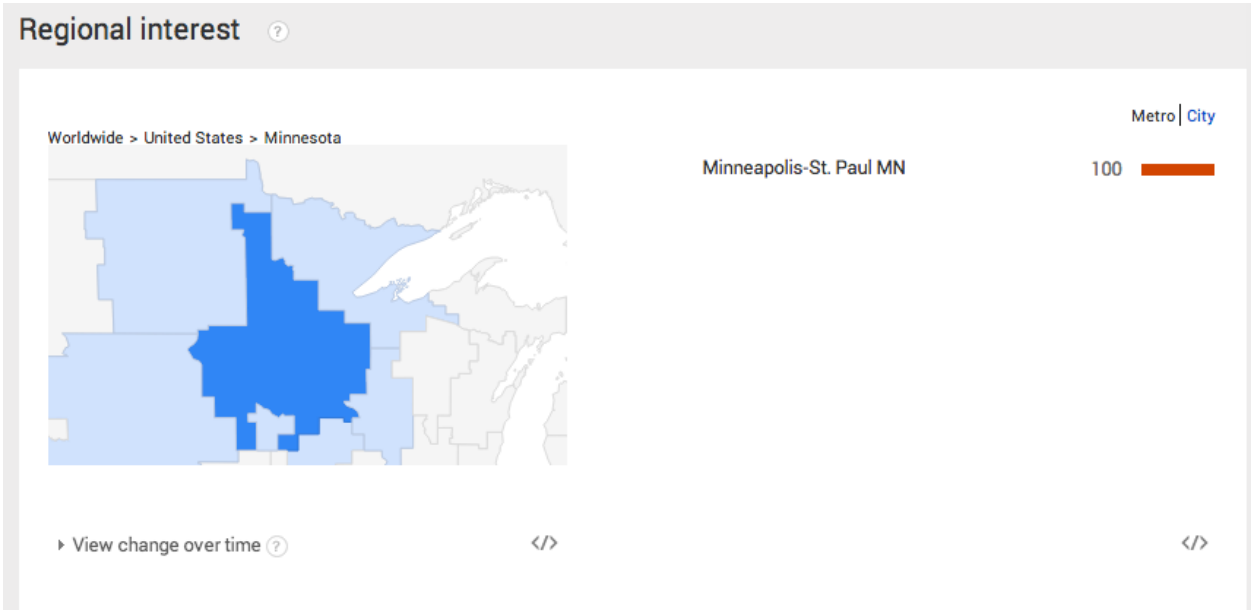
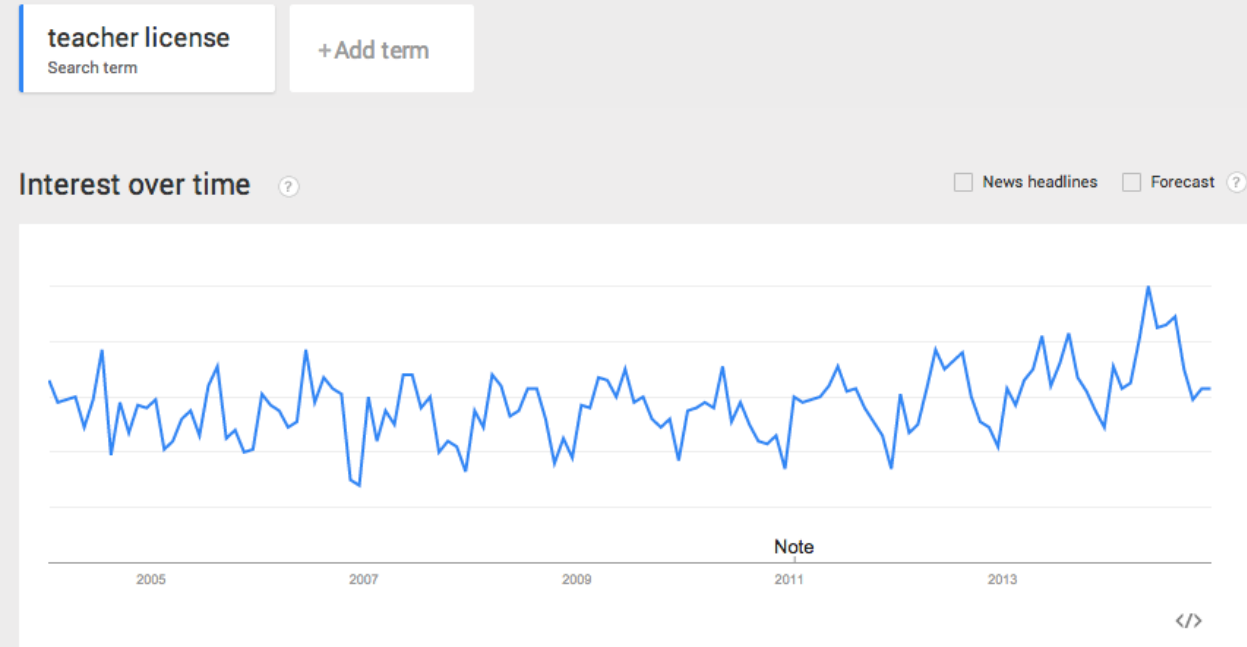


Exhibit C, continued



Queries	Top	Rising
mn teacher license	100	
minnesota teacher license	75	
teacher license lookup	50	
minnesota teaching license	20	
mn teaching license	20	

Quantitative Appendix

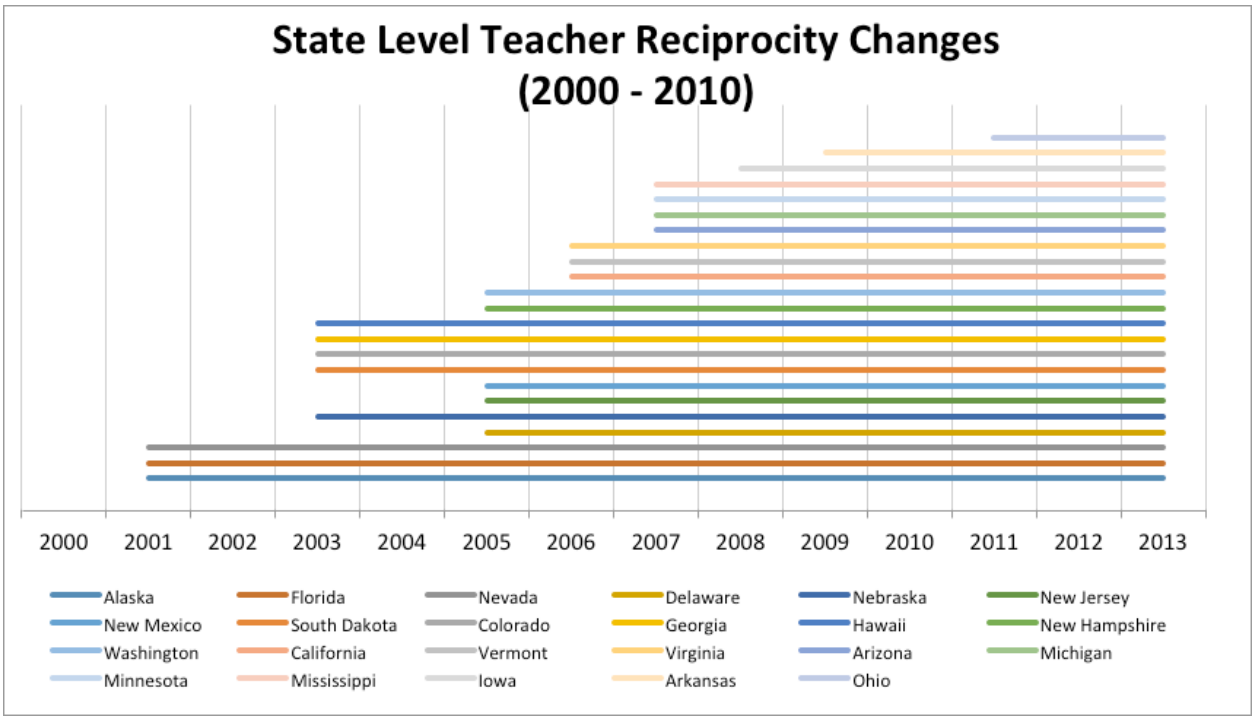
Table 1: Number of Self-Identified Teachers and Teaching Assistants in Sample, 2000 -2012

	Teachers	Teaching Assistants
N	659, 974	114, 628

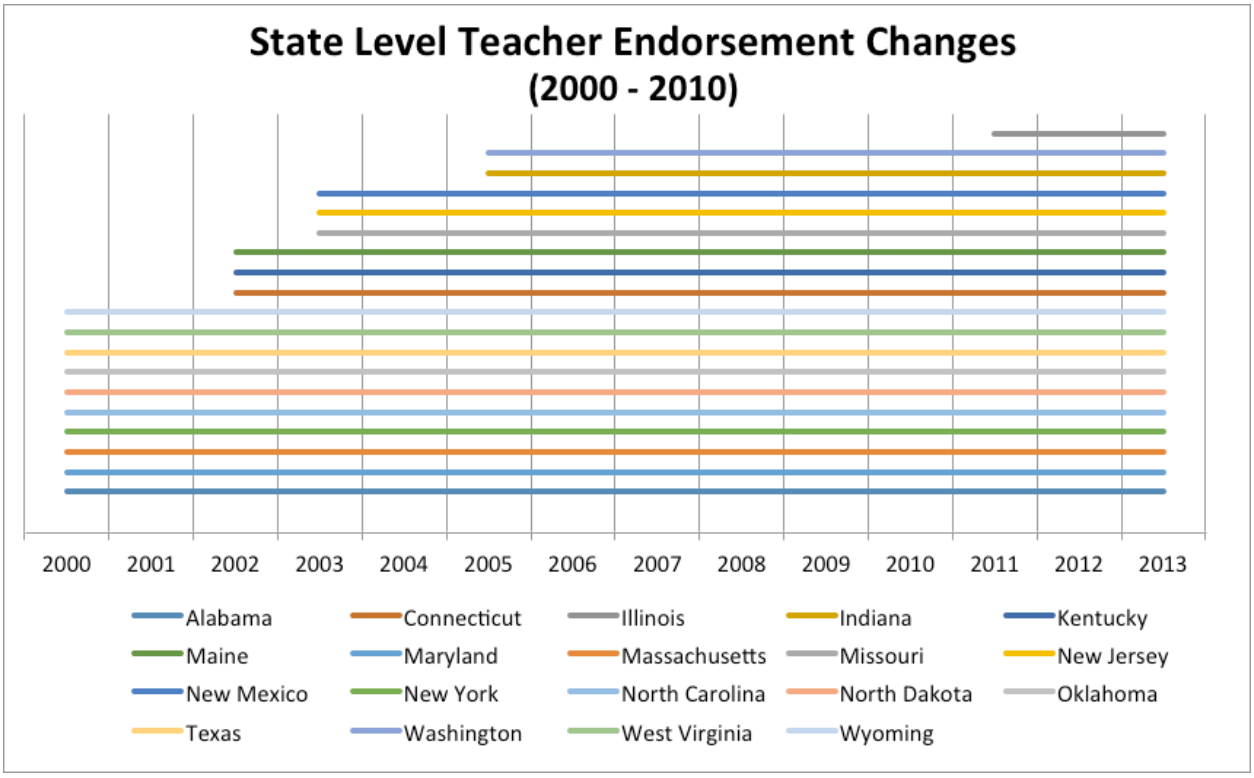
Table 2: Individuals Living in States with Reciprocity or Endorsement

	Reciprocity	Endorsement
All Individuals	640,009	747,744
Teachers	233,769	270,997
Teaching Assistants	39,360	47,934

Graph 1: State Level Changes in Reciprocity, 2000 – 2012



Graph 2: State Level Changes in Endorsement, 2000 – 2012



Description of Variables

Census Type	Variable	Description
Individual	MIGRATE1 (general)	Migration status, 1 year [general version]
		Code Label 0 N/A 1 Same house 2 Moved within state 3 Moved between states 4 Abroad one year ago 9 Unknown
Individual	MIGRATE1D (detailed)	Migration status, 1 year [detailed version] Code Label 00 N/A 10 Same house Different house: 20 Moved within state 21 Moved within county 22 Moved across county 23 Moved within PUMA 24 Moved between PUMAs 25 Unknown within state 30 Moved between states 31 Moved between contiguous states 32 Moved between non-contiguous states 40 Abroad one year ago 90 Unknown
Individual	MIGPLAC5	State or country of residence 5 years ago (incomplete)
Individual	MIGPLAC1	State or country of residence 1 year ago
Individual	MIGCITY5	City of residence 5 years ago (incomplete)
Individual	MIGCITY1	City of residence 1 year ago
Individual	MIGpuma	PUMA residence 5 years ago (incomplete)
Individual	MIGPumas	Super-PUMA residence 1 year ago
Individual	WORK5YR	Working 5 years ago (incomplete)
Individual	PWMETRO	Place of work: metropolitan area
Individual	PWCITY	Place of work: city

[variables organized by geographic, demographic, economic, and migrational type terms]

Census Type	Variable	Description
Household	YEAR	Census year
Household	HHWT	Household weight
Household	REGION	Census region and division
Household	STATEFIP	State (FIPS code)
Household	HHincome	Total Household Income
Household	pernum	Person a personal identifier
Household	famsize	Number of own family members in household
Household	nchild	Number of own children in the household
Household	CITY	City
Individual	Age	Age
Individual	Sex	Gener
Individual	marst	Marital Status
Individual	Citizen	Citizenship Status
Individual	PERWT	Person weight (how many people in the general population are represented by this individual)
Individual	HIGRADE (general)	Highest grade of schooling [general version]
Individual	HIGRADED (detailed)	Highest grade of schooling [detailed version]
Individual	EDUC (general)	Educational attainment [general version]
Individual	EDUCD (detailed)	Educational attainment [detailed version]
Individual	DEGFIELD (general)	Field of degree [general version]
Individual	DEGFIELDD (detailed)	Field of degree [detailed version]
Individual	DEGFIELD2 (general)	Field of degree (2) [general version]
Individual	DEGFIELD2D (detailed)	Field of degree (2) [detailed version]

Census Type	Variable	Description
Individual	OCC	Occupation
Individual	Looking	Looking for work
Individual	workedyr	Whether the individual was employed within the last year
Individual	inctot	Total personal income
Household	ftotinc	Total family income
Individual	incwage	Wage and salary income
Individual	Incother	Other income
Individual	Poverty	poverty status
Individual	MIGRATE5 (general)	Migration status, 5 years [general version] Code Label 0 N/A 1 Same house 2 Moved within state 3 Moved between states 4 Abroad one year ago 9 Unknown
Individual	MIGRATE5D (detailed)	Migration status, 5 years [detailed version] Code Label 00 N/A 10 Same house Different house: 20 Moved within state 21 Moved within county or municipio 22 Moved across county or municipio 23 Moved within PUMA 24 Moved between PUMAs 25 Unknown within state 30 Moved between states 31 Moved between contiguous states 32 Moved between non-contiguous states 33 Unknown between states 40 Abroad five years ago 80 Moved (place not reported) 90 Unknown